Management of Change & Pre-Startup Safety Review W-A2

Albert Welsh, Sr. IMS Specialist, LI NAM
Diane Ho, Risk Management Specialist, LI NAM
Thomas Turner, Production Manager, Rodeo SMR, LI H2/Syngas

Speakers

Albert Welsh

Diane Ho

Thomas Turner

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Safety Moment

Albert Welsh

Safety Moment

- **Williams Olefins Plant Explosion and Fire**
  - A fire and explosion occurred on Thursday June 13, 2013, which fatally injured two workers at the William Olefins, Inc., plant located in Geismar, Louisiana.

KEY ISSUES:

- Overpressure Protection
- Process Hazard Analysis
- Management of Change
- Pre-Startup Safety Review
- Operating Procedures
- Hierarchy of Controls
- Process Safety Culture

(1) Williams did not perform adequate Management of Change (MOC) or Pre-Startup Safety Reviews (PSSRs) for two significant process changes involving the propylene fractionator reboilers—the installation of block valves and the addition of car seals (see Section 5.1 and Section 5.2.2.1).[29] As a result, the company did not evaluate and control all hazards introduced to the process by those changes. Not identifying and controlling the new process overpressurization hazard was causal to the incident;

TLA

- Does anyone's mental sponge have TLA Overload?
- Does anyone here in the audience know what TLA stands for?

Three Letter Acronym

What does MOC Stand for:

I found these definitions while doing a Google search for:
"What does the acronym MOC stand for?"

- Meta Object Compiler
- Maintenance Of Certification
- Market On Close
- Moment Of Confusion

And finally, Management of Change!

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MOC Word Storm

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Overview

Thomas Turner

Agenda

1. Definitions & Regulations
2. Management of Change
3. Pre-Startup Safety Review
4. Breakout Session
5. Case Study
6. Q & A

Definitions & Regulations

CalARP Program 3 & 4

Thomas Turner

CalARP MOC Definition (Section 2760.6 of CCR Title 19)

CalARP Program 3

- A process to evaluate and properly manage any modifications to the design, control, or operations of a covered process:
  - Chemicals, Technology, Equipment, Procedures
  - And changes to stationary source

CalARP Program 4

- Adds “management of organizational change” (MOOC)

MOC can also apply to Program 1 & 2

CalARP MOC Definition (Section 2760.6 of CCR Title 19)

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

(b) The procedures shall assure that the following considerations are addressed prior to any change:

1. **Technical basis** for the proposed change;
2. Impact of change on **safety and health**;
3. Modifications to **operating procedures**;
4. Necessary **time period** for the change; and,
5. **Authorization requirements** for the proposed change.

CalARP Pre-Startup Definition (Section 2760.7 of CCR Title 19)

The owner or operator shall perform a pre-startup safety review for new stationary sources and for modified stationary sources when the modification is significant enough to require a change in the **process safety information**.

(b) The pre-startup safety review shall **confirm** that prior to the introduction of regulated substances to a process:

1. **Construction and equipment** is in accordance with **design specifications**;
2. **Safety, operating, maintenance, and emergency procedures** are in place and are adequate
3. For new stationary sources, a **PHA has been performed** and r**ecommendations have been resolved** or **implemented before startup**, and modified stationary sources meet the requirements contained in management of change, Section 2760.6; and,
4. **Training** of each employee involved in operating a process has been completed.

Authority cited: Sections 25531 and 25534.05, Health and Safety Code. Reference: Section 25531, Health and Safety Code; and Section 68.77, Part 68, Title 40, Code of Federal Regulations.

What is PSI?

In defining the **Process Safety Information** (PSI) requirements, the PSM regulation (Title 8 CCR §5189(d) and Title 29 CFR §1910.119(d)) divides PSI into three (3) distinct categories:

- Information Pertaining to the **Hazards** of the Process
  - SDS
- Information Pertaining to the **Technology** of the Process
  - PFD, Max Inventory, Process Chemistry, Limits of Ops, Consequences of Deviation
- Information Pertaining to the **Process Equipment**
  - Materials of Construction, P&ID, Electrical Classification, Relief System & Design Basis, Ventilation Design, Design Codes & Standards, Interlock & Safety Systems

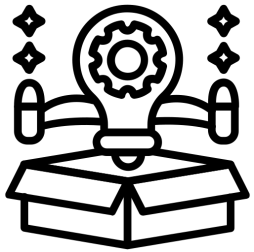
Each category has unique prescriptive requirements that must be gathered and developed in order to achieve compliance.

What is a PSSR and RTOR?

Pre-Startup Safety Review

- A tool used by a team during a safety review of a new or modified facility before commissioning.

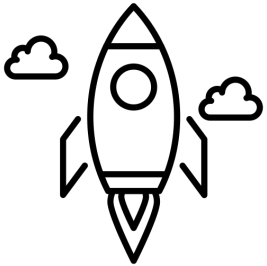
Permission to Commission!



Ready to Operate Review

- A tool used by a team during a safety review following commissioning to determine operational readiness.

Permission to Operate!



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RIK vs Change

- **Replacement-in-kind (RIK) -** an item (equipment, chemicals, procedures, organizational structures, people, etc.) that meets the design specification, if one exists, for the item it is replacing.*

- **Change -** Any addition, process modification, or substitute item (e.g. person or thing) that is not an RIK.*

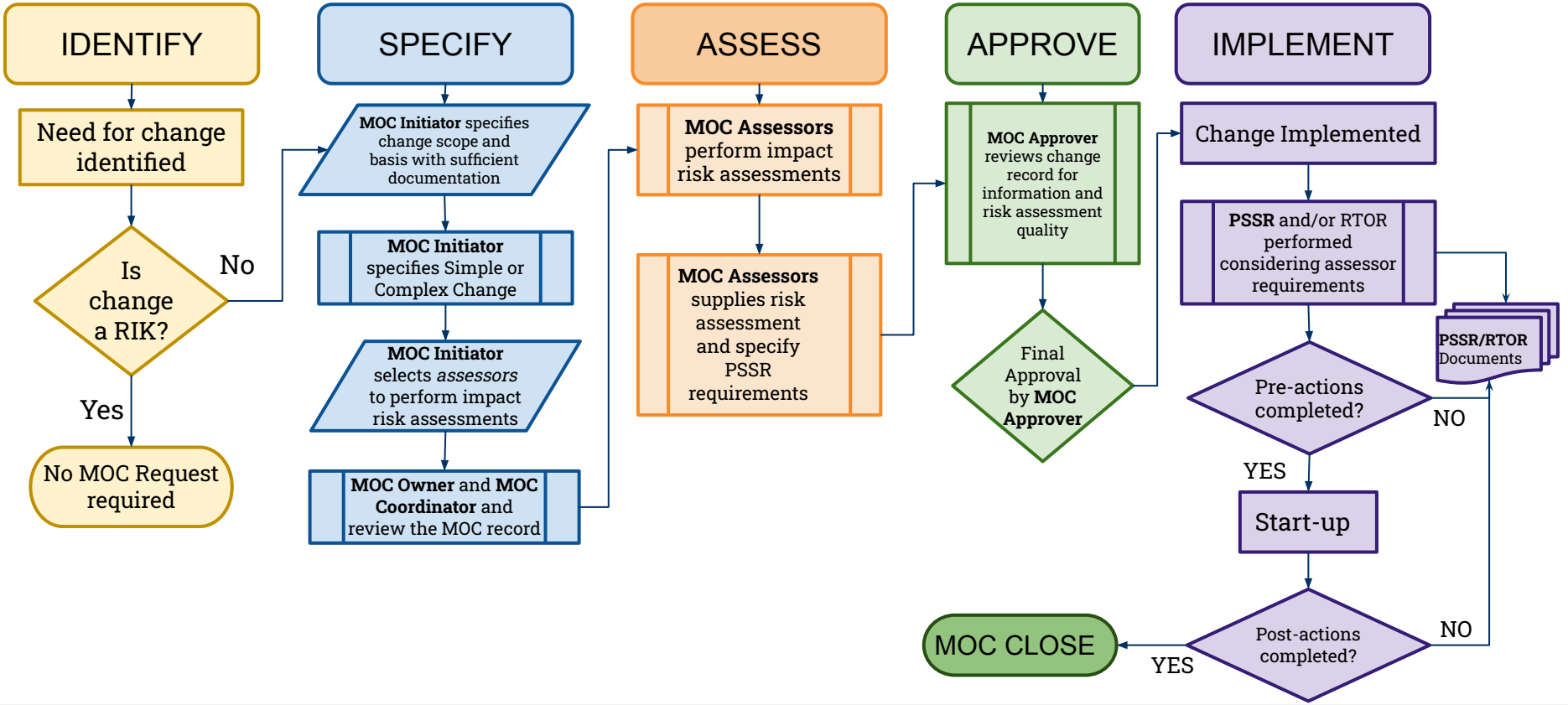
*Definitions from CCPS Guidelines for Management of Change for Process Safety

Management of Change

MOC Workflow

Diane Ho

MOC Process Overview



MOC Stakeholders and Responsibilities

Role	MOC Stage	Responsibility
MOC Initiator	IDENTIFY	Specifies scope, supplies supporting documents, organizes design reviews, selects assessors to perform impact risk analysis
MOC Owner	SPECIFY	Approves MOC before routing to assessors, ensures MOC Process is following and personnel are trained, monitors open MOCs
MOC Coordinator	SPECIFY	Reviews supporting documentation, ensures assessors are appropriate and that design reviews are included as necessary
MOC Assessors	ASSESS	Evaluates impact of change in their specific discipline, supplies risk assessment documentation, and specifies PSSR requirements
MOC Approver	APPROVE	Performs final review of MOC. Checks supporting documentation, design reviews, list of assessors, risk assessments
Project Manager	IMPLEMENT	Executes change, conducts PSSR, and coordinate with Operations for implementation
MOC Owner	CLOSE	Ensure all action items are closed, all PSI are updated, and close the MOC

MOC: Special Situations

MOC Revisions

- Recycling of MOC
- Revised SOW

Void MOC

- After MOC approval
- Work not started

MOC Extensions

- Approved MOC
- Work started but not completed
- Post-startup actions not completed

Cancel MOC

- Prior to MOC approval
- No work started

Process Conditions

- Transient Modes
- Abnormal Modes
- Procedure Changes

Emergency MOC

- Immediate Change requiring verbal or written approvals
- Paperwork follows change
- **Poor Planning Does Not an Emergency Make!**

Pre-Startup Safety Review

PSSR Workflow

Thomas Turner

Pre-Startup Safety Review

What are the benefits of performing Pre-Startup Safety Reviews?

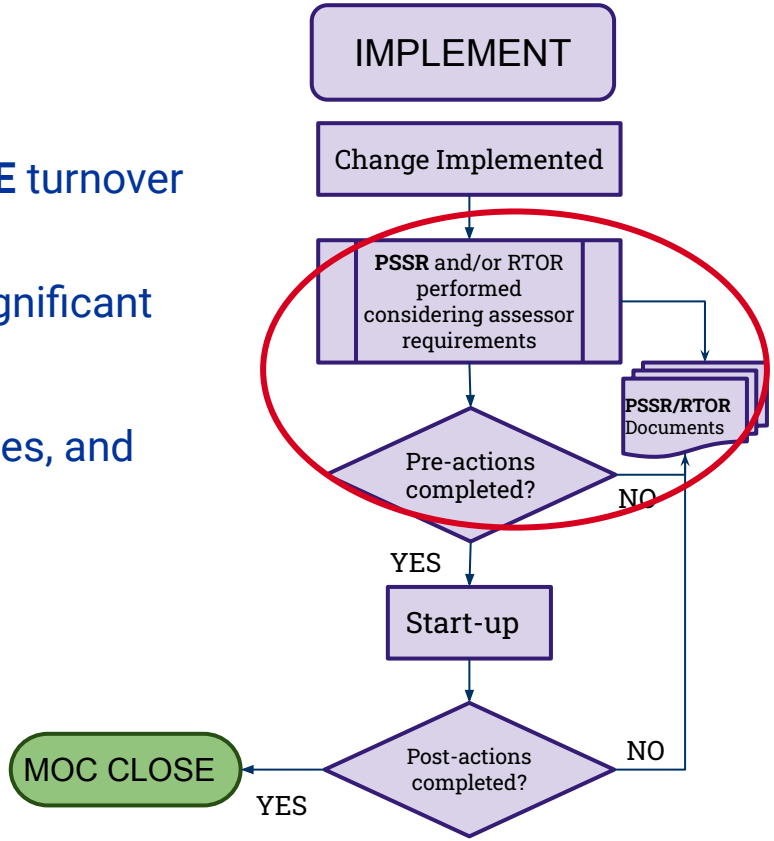
- The change is more likely to operate **as intended**
- Pre-startup activities have been completed and post-startup activities are scheduled and **tracked** to help ensure that equipment is designed, fabricated, procured, installed, operated, and maintained in a manner appropriate for its intended application.
- Regulatory requirements for managing changes are met (Recall PSI).
- PSSR provides an opportunity for turnover of ownership from engineering or project managers to operations personnel (RTOR = ready to operate review)

*Definitions are from CCPS Guidelines for Performing Effective Pre-Startup Safety Reviews

Pre-Startup Safety Review

When to Do a PSSR?

- **AFTER** change has been implemented and **BEFORE** turnover to Operations
- **Program 3:** Performed when the modification is significant enough to require a change in PSI
- **Program 4:** Performed for new & modified processes, and partial & unplanned shutdowns.



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Does PSSR apply?

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Pre-Startup Safety Review

How Many PSSRs are needed? Documentation & Checklists:

1. Safety & Health
2. Environmental
3. Documentation & Training
4. Piping & Valve
5. Pressure Vessel / Heat Exchanger
6. Relief Valve
7. Mechanical / Rotating Equipment
8. Maintenance
9. Instrumentation
10. Electrical
11. Analyzer
12. Control System
13. Siting
14. General

PSSR Confirmation of Functional Checklists	NA	OK	NOT OK	Responsible Person (Print)	Initials (if available)	Date
Safety & Health Checklist						
Environmental Checklist						
Documentation & Training Checklist						
Piping & Valve Checklist						
Pressure Vessel / Heat Exchanger Checklist						
Relief Valve Checklist						
Mechanical & Rotating Equipment Checklist						
Maintenance Checklist						
Instrument Checklist						
Electrical Checklist						
Control System Checklist						
Analyzer Checklist						
Siting Checklist						
General Checklist						
All PSSR team startup commendations identified on the attached **Pre-Startup Punchlist** have been resolved or completed so that the system may be placed into operation.						
Post-Startup Punchlist which contains the target dates for completion have been developed and is attached.						

Ready to Operate Review

An RTOR is the final check conducted prior to putting a newly commissioned equipment or engineered system into operation.

- **High level review** to ensure all actions from PSSR have been implemented
- **Ensure** the system has **not been impacted** by any work performed during **commissioning**

No.	Description	N/A	OK	Not OK
1	Required permits have been obtained and the Facility meets permit specifications or appropriate temporary derogation. Insurance coverage necessary for startup and industrial/commercial operation is in place. [Permits are on file at site and loaded into Intelex.]	☐	☐	☐
2	Installation conforms to the validated design. [Design Review Checklist signed off.]	☐	☐	☐
3	Risk studies and hazard reviews are available and risks identified have been addressed. [PHA pre-start action items are completed.]	☐	☐	☐
4	Documentation of all inspections and tests required by codes and regulations is available and maintenance schedules have been included in Maximo.	☐	☐	☐
5	Health and safety provisions are in place (job hazard analysis, personal protection equipment, safety procedures, emergency response plan, fire detection and fire fighting equipment, etc). [PSSR is completed. Pre-start-up actions are resolved.]	☐	☐	☐
6	Key process and safety systems are operational. [Interlocks and safety systems have been implemented, tested, and are operational.]	☐	☐	☐
7	Elements Important for Safety which require inspection, or verification or on-site testing are operational and inspection, or verification or test records are available at the Facility. [EIS have been implemented, tested, and are operational.]	☐	☐	☐
8	The current version of the operating manual including engineering and process documentation is available at the Facility. Key engineering documents, notably electrical and instrument drawings, piping and instrumentation diagrams, process flow sheets, vendor supplied equipment drawings and data are marked up to show "as built" conditions. Key Operating Documents, notably the SOPs required for operations, are complete and available to operators (refer to IMS_GP13 for typical list of Key Operating Documents). [Redlined documents available to operations in order to operate.]	☐	☐	☐
9	Operators have received the training and qualification required to operate the installation safely and reliably. [Records of qualification and competency assessments are documented, preferably in LMS.]	☐	☐	☐
10	The procedures and spare parts required to maintain the Facility are available.	☐	☐	☐

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PSSR Verification

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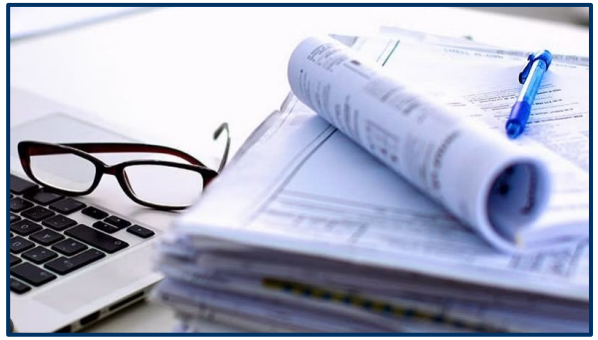
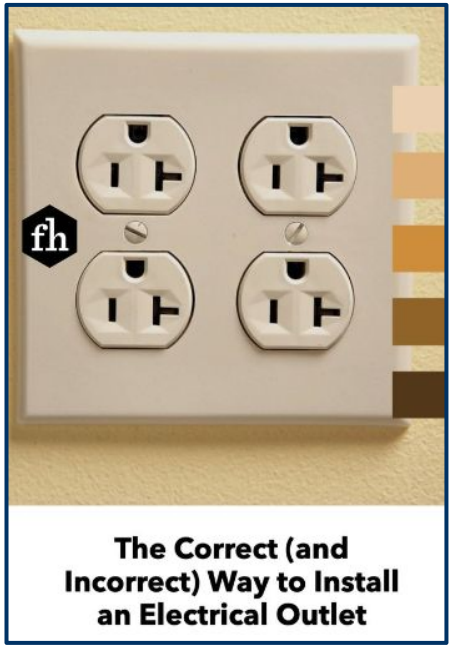
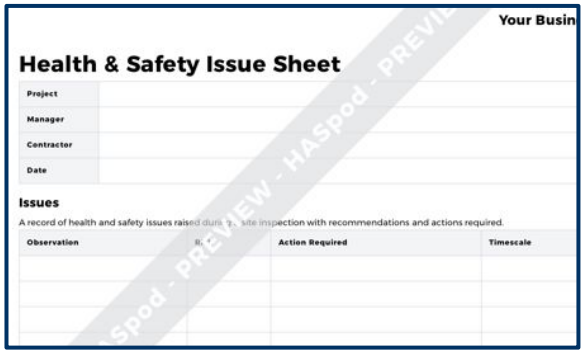
Pre-Startup Safety Review

Common Problems:

- Lack of documentation
- Paperwork follows change
- Work done in PSSR
- Procedures only verified once
- Training only confirmed once
- No H&S Impact Documentation







Pre-Startup Safety Review

Checklist Challenges - S&H:

- S&H Impacts for regulated substance
- Startup, shutdown, & emergency impact
- Working environment changes
- Safety Systems & Critical Lifts
- Emergency egress/access & response
- Regulatory impacts - vessel changes & existing tank changes

Breakout Session

MOC & PSSR Examples

Diane Ho and Thomas Turner

Breakout Examples - 20 mins

1. Installing basketball goal in driveway

Instructions to put together goal

Digging hole (depth), pouring concrete

Proper PPE

2. Installing holiday lights on your roof

Design specs

Elevated work

Lifted spirits

3. Hook up & install BBQ grill

- Propane
- Natural Gas

Full stomachs

Proper PPE

Breakout Examples - 20 mins

4. Installing a pool

- Above ground
- Underground

Aerobic exercise

Training

5. Installing an EV charger in Garage

Operating procedures

Proper PPE

6. Installing storage shelving in garage

Proper PPE

Organization

Breakout session packages

1. **What needs to be included in MOC package?**
    a. Scope of Work
    b. Drawings/Schematics
    c. Specifications
        i. Get as creative and as much details as you can think of!
2. **What PSSR checklists need to be conducted?**
    a. Safety & Health
    b. Siting
    c. Documentation & Training
        i. Give top 5 items to have on checklist

Case Study

Management of Change & PSSR Retrospective

Albert Welsh

Equilon Enterprises Oil Refinery Fire

CSB MOC Event

BACKGROUND & INCIDENT

- A fire at the oil refinery delayed coking unit caused six fatalities
- Prior to fire, loss of electric power and steam supply led to abnormal process conditions
- Previous incident recommended written procedures for abnormal conditions - cooling/emptying partially filled drums
    - No procedure was available for Operations
- No Engineering technical support available to provide guidance to Operations in absence of written procedures
- Operations made the decision to perform an abnormal task without any review of the current situation

LESSONS LEARNED

- MOC policies should include **abnormal situations**, **changes** to procedures, and **deviations** from standard operating conditions
- The skills of a multidisciplinary team may be required to thoroughly **identify** potential **hazards**, develop **protective measures** and propose a course of action
- Variance procedure and formal risk analyses should be incorporated into MOC system to assure deviations do not create unacceptable risks

CONDEA Vista Company Explosion and Fire

BACKGROUND & INCIDENT

- A reaction vessel explosion and fire injured four people, no fatalities
- Prior to the incident, the facility changed its process technology
- Shortly after this change, the reactor became fouled with sludge-like catalyst residue and plugged the bottom outlet nozzle
- Addition of water and steam to reactor to clear the plug
    - Recommended by chemist and engineer
- Improper instructions to Operations led to a reaction in the vessel and causing it to explode

LESSONS LEARNED

- This incident emphasizes the importance of systematically managing changes
- The plan recommended by the chemist and engineer posed new hazards, which were not mitigated with any additional protections
    - Hazard analysis could have helped to identify the potential safety issues and mitigations
- Written procedures for variances in operating conditions would have reduced the likelihood of miscommunication between shifts
    - Define safe limits for process conditions & train personnel
- Approvals for abnormal situations through MOC

CSB MOC Event

Closing Thoughts

All

Summary

- **CalARP Definitions**
  - Program 3 or 4
- **Management of Change**
  - Successful MOC implementation requires cultural change so personnel understand the importance and benefits of MOC
- **Pre-Startup Safety Reviews**
  - PSSR program is a second layer of protection around MOC element. An effective PSSR depends on the tools used to evaluate the safety and operational readiness following a change.

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Questions?

Albert Welsh, albert.welsh@airliquide.com, 626-616-9779
Diane Ho, diane.ho@airliquide.com, 225-485-1970
Thomas Turner, thomas.turner@airliquide.com, 925-322-9153