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Management of Change

Daniel Stein

14 October 2025
Vancouver, BC, CA

WORLDCHLORINE.COM

Newspaper Comic

**“I’m naming you VP of Revolution, Action and Edgy Thinking ...
on one condition ...
that you promise not to change anything.”**

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Agenda

- Theory
- Roles & Work Process
- Practical Examples & Lessons Learned
- Regulatory Requirements & Resources

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THEORY

Management of Change → Defined

> A management system to identify, review, and approve all modifications to equipment, procedures, raw materials, and processing conditions, other than replacement in kind, prior to implementation to help ensure that changes to processes are properly analyzed (for example, for potential adverse impacts), documented, and communicated to employees affected.

Center for Process Safety (CCPS) Process Safety Glossary

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Management of Change → Defined

In Other Words:

- Identify the Change
- Analyze the Change
- Review and Approve the Change to ensure no adverse impacts
- Communicate the Change to Affected Parties
- Document the Change

Bonus: Invite feedback on the change from affected personnel.

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Real News Story

AMERICA

Organic Cat Litter Chief Suspect In Nuclear Waste Accident

MAY 23, 2014 · 4:24 PM ET

HEARD ON ALL THINGS CONSIDERED

Geoff Brumfiel

3-Minute Listen + PLAYLIST

Workers at the Waste Isolation Pilot Plant are still investigating what caused a radioactive release at the site, but organic cat litter may be the culprit.

DOE/WIPP

- Cat litter used to stabilize volatile radioactive waste in metal drums for transport
- Switched litter type from clay to organic
- Resulted in exothermic reaction
- Drum ruptured
- 500 drums had the same issue
- Other drums encased to prevent additional spillage

Source: National Public Radio (NPR) “Organic Cat Litter Chief Suspect In Nuclear Waste Accident,” May 23, 2014

Why are MOCs Important?

- Processes are complex and interdependent
- Maintain facility Process Safety Information (PSI) integrity
- Unanalyzed changes can lead to:
  - Personnel Injuries
  - Accidental Chemical Releases
  - Environmental Insults
  - Equipment Failures
  - Product Quality Issues
  - Production Interruptions

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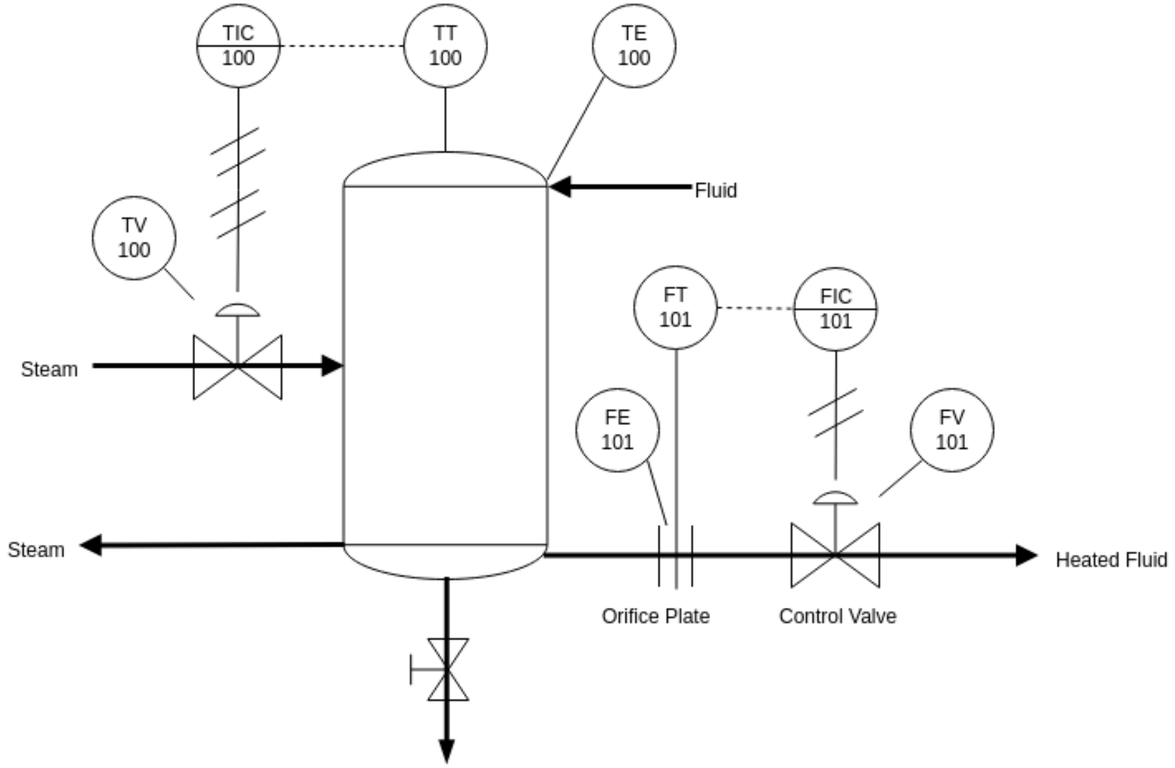
Where should MOCs Apply?

- Technology
- Equipment
- Policies & Procedures
- Staffing Changes



Example: Piping & Instrument Diagram

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Management of Change → Exemptions?

- “Replacement in kind” (RIK)
- Temporary or short-term changes already authorized under an approved procedure
- Administrative or non-process changes
- Office personnel changes

Q: …What about contract personnel?

A: Not exempted.

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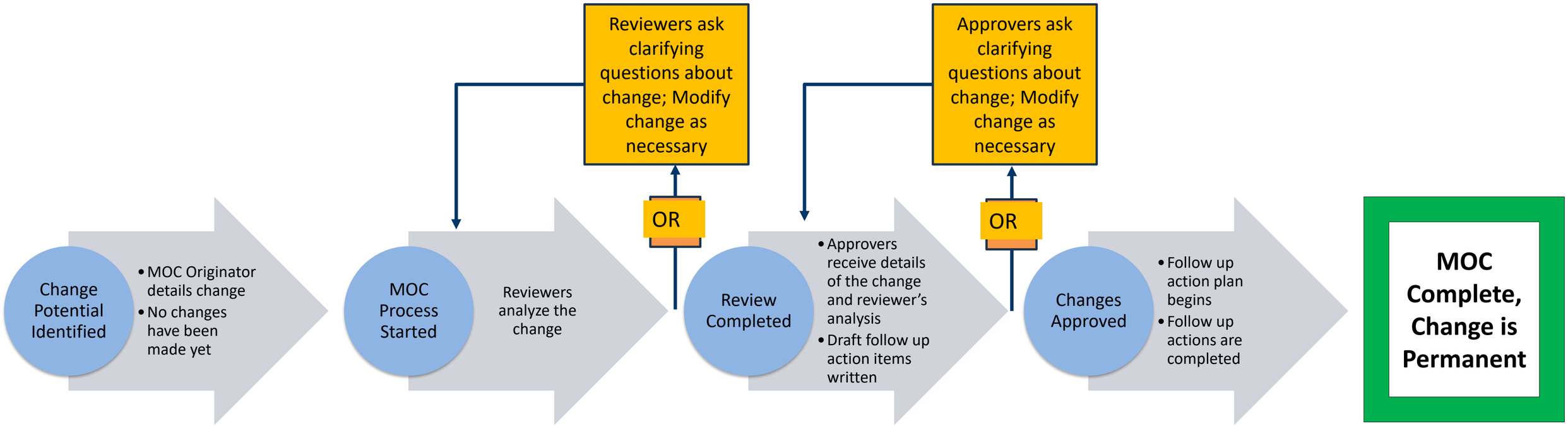
Types of MOCs

- **Permanent**
  - Company-wide changes
  - Facility-specific changes
- **Temporary**
  - Emergency Scenarios
  - Defined expiration / reauthorization date
- **Document-only**
  - No field impacts – certain policies or procedures

Permanent MOC Life Cycle



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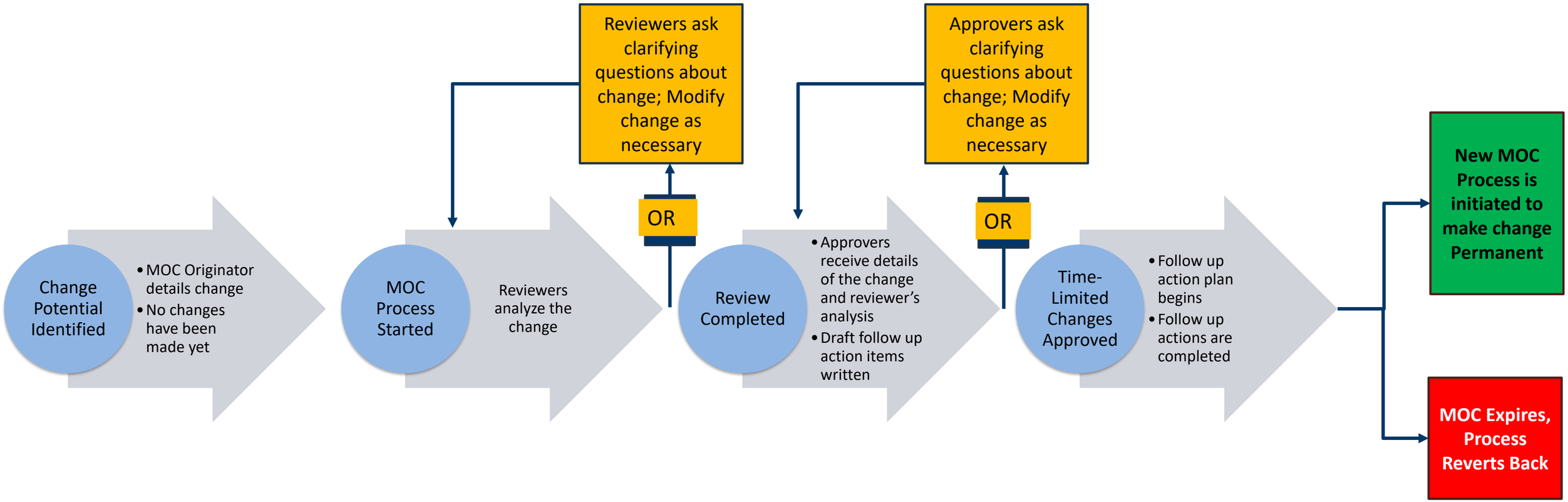
Temporary MOC Life Cycle



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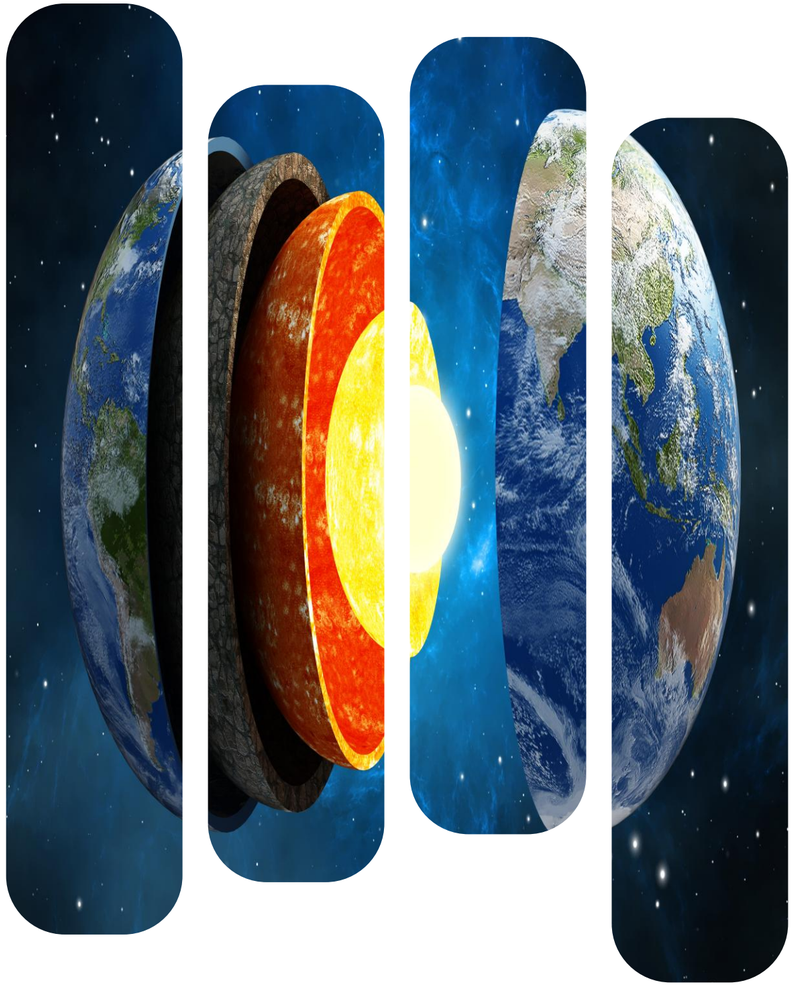
Tips: Global v. Facility Implementation

- MOCs may be intended for a wider target audience than a single local facility
  - e.g., company-wide EHSS or Transportation policy or procedure changes
- Important to evaluate MOC applicability by location
  - e.g., some locations may not generate certain types of waste, handle certain chemicals, or transport certain types of containers / packages
- Electronic MOC software → consider integrating a “facility selection” process enabling a single initiative or change to be documented via use of global MOC (avoids each facility initiating separate MOCs).
- For global MOCs → consider appointing a “Local Change Owner” at each facility



Tips: MOC Systems & Tools

Legacy Systems

- Metrics: Manual and labor-intensive
- Error-Prone
  - Inputs can be missed.
  - Temporary changes can slip overdue.
- Action Items
  - Managed by hand.
  - Manual notifications.
  - Risk personnel friction.
- Attachments: Printed & Scanned
- No/Manual integration
- Little room for evolution

Modern (Electronic) Systems

- Metrics: Automated and detailed
- Error-Proofed
  - Data validation & required fields.
  - Notifications and reports for upcoming deadlines.
- Action Items
  - Generated by system.
  - Automated notifications.
  - Blame pointed at the machine.
- Attachments: Digital Files & Links
- Many Integration Options
- The Future Looks Bright!

Source: Thaler, Brooke (2025). Lessons in Management of Change. OxyChem.

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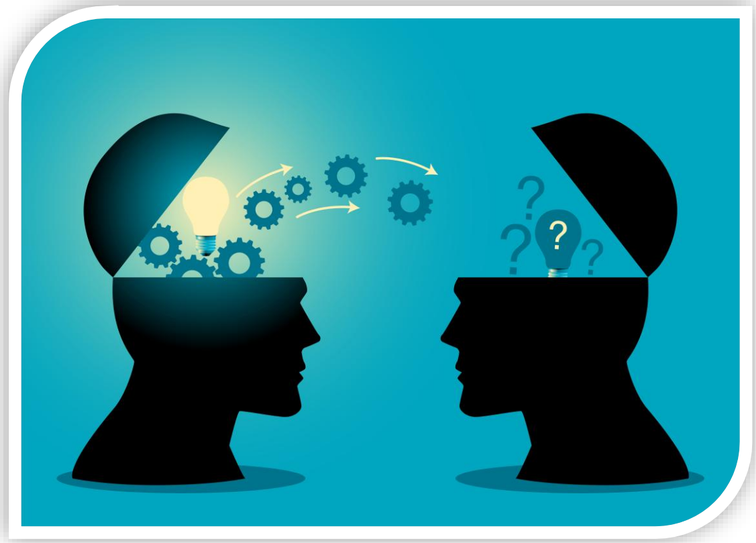
Roles & Work Process

MOC – Roles & Responsibilities

Discuss a common approach towards MOC Roles & Responsibilities in the Chemical Industry:

- MOC Originator
- MOC Owner
- MOC Reviewers
- MOC Approver
- Affected Personnel



Note: This presentation is not intended to be all inclusive as organizations may utilize other methods to accomplish Management of Change obligations.

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...But first... a story of Ember & Ripley

Ember Stein

- *Age: 3 Years*
- *Gender / Ethnicity:*
  - *Female Brown Tri-Color Australian Shepard*
- *Weight: 47 lbs.*

Ripley Stein

- *Age: 9 Months*
- *Gender / Ethnicity:*
  - *Female Black Tri-Color Australian Shepard*
- *Weight: 40 lbs.*


Ripley… I’ve got a plan.


I’m still new
☺

MOC – Roles & Responsibilities

- **Current Practice:** Both Ember & Ripley receive 1 cup of tuna-based dog food twice per day.
- **Proposed Change:** Based upon recent Tik-Tok health guidance, Ember proposed a change to 1 cup of lamb-based dog food three times per day.

MOC Execution Details:

- Ember **originated** the change and appointed Ripley as the **MOC Owner**
- Both Ripley and Ember served as the **MOC Reviewers** (Subject Matter Experts (SMEs)) for various disciplines (i.e., safety, logistics, chemistry, infrastructure, and storage) …*despite lacking some knowledge*
- No additional justification was provided within the written MOC
- A food specification sheet was attached to the MOC, however, no Action Items were identified prior to MOC implementation
- Ember provided **MOC Final Approval** and the change was placed into service
- Ripley identified the affected personnel as: *Ember, Ripley, Molly, and Daniel*

MOC – Roles & Responsibilities

Negative outcomes due to lack of proper MOC execution:

- Cost of feeding drastically increased due to both volume and food pricing and no consideration was given to Stein Family Corp. monthly budgeting
- New food packaging is non-recyclable and negatively impacts Stein Family Corp. 2030 sustainability targets
- Food Supplier was not notified of this change and is in low supply further exacerbating cost and damaging relations
- No consideration was given to food storage and the cabinet is now full. Baby Clay Stein *(not identified as an affected person)* now smearing and eating dog food.
- Ripley has experienced illness due to dietary changes as health impacts were not considered
- Schedules strained due to lunch time feeding and restroom breaks

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MOC – Roles & Responsibilities

…important!

Key Points:

- Important to identify any conflicts of interest to achieve a balanced MOC review
- Important to have proper MOC Reviewers (SMEs) to flag critical changes (e.g., dietary restrictions) or unforeseen logistical, scheduling, or infrastructure problems
- Experienced employees may influence less-experienced persons
- Important to consider external impacts such as supplier / end-user
- This change proposal could have been modified to achieve a positive outcome with appropriate Action Item considerations
- MOC can be effective for many processes …not just those aspects covered by OSHA Process Safety Management

MOC – Roles & Responsibilities

Root Cause Analysis:

Stein Family Corp. lacked initial MOC Work Process Training for new employees

Corrective Action:

Ember & Ripley were trained and certified on MOC Work Processes and received cake as an award for their completion.

Ripley felt shame for her career, but Ember has moved forward without pause.

MOC – Roles & Responsibilities

- **MOC Originator** – responsible to craft scope and clearly articulate using drawings, specification sheets, photos, or other illustrative means.
- **MOC Owner** – responsible to further develop scope and justification detail (with input from stakeholders) and identify proper MOC Reviewers / SMEs.
- **MOC Reviewers / SMEs** – responsible for specific discipline review. Provide comments on other disciplines as appropriate.

MOC – Roles & Responsibilities

- **MOC Approver** – ensures completeness of MOC Scope, Justification, and Review completion with all Action Items documented.

- **Affected Personnel** – responsible to review and provide comments or feedback prior to interacting with any change and acknowledge changes in a timely fashion.

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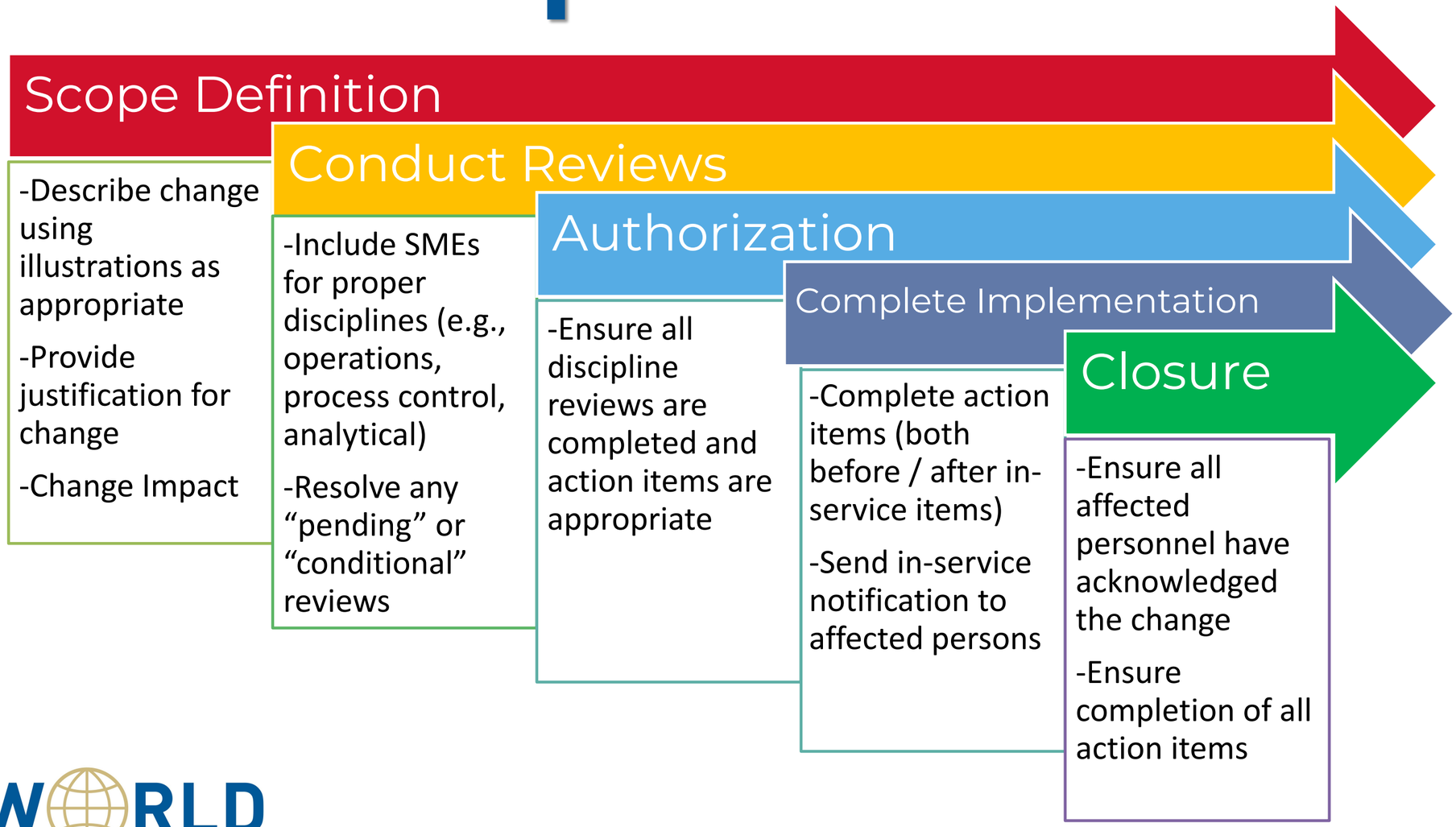
MOC – Example Work Process



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Practical Examples & Lessons Learned

What Triggers an MOC?

A. Replacement of a centrifugal pump from the same vendor, same make, and same model.

B. PVC elbow on a bleach line cracked. Maintenance has a spare and is entering a work order to replace.

C. A new style of eductor will be installed so the barometric loop can operate more efficiently.

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What Triggers an MOC?

A. New stationary chlorine monitors are added to the fence line and incorporated in the shutdown logic.

B. The stationary chlorine monitor is recalibrated.

C. A torn windsock is replaced with a different colored windsock.

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What Triggers an MOC?

A. The shutdown procedure undergoes its periodic, scheduled review. No changes were identified, and it was re-certified as accurate.

B. A new company-wide policy is implemented, requiring all employees not assigned to the operating unit and visitors to sign in and out whenever they enter the area.

C. Human resource changes the schedule by which it conducts annual safety training.

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What Triggers an MOC?

A. Due to budget cuts, one operator position is removed from night shift. That operator normally did the midnight and 4 a.m. rounds to ensure there were no undetected leaks.

B. A long-term substitute shift supervisor is filling in for four months while the original shift supervisor is on medical leave.

C. A trainee operator is assigned to the unit and is doing on-the-job training for two months, learning to conduct all tasks alongside the experienced operator.

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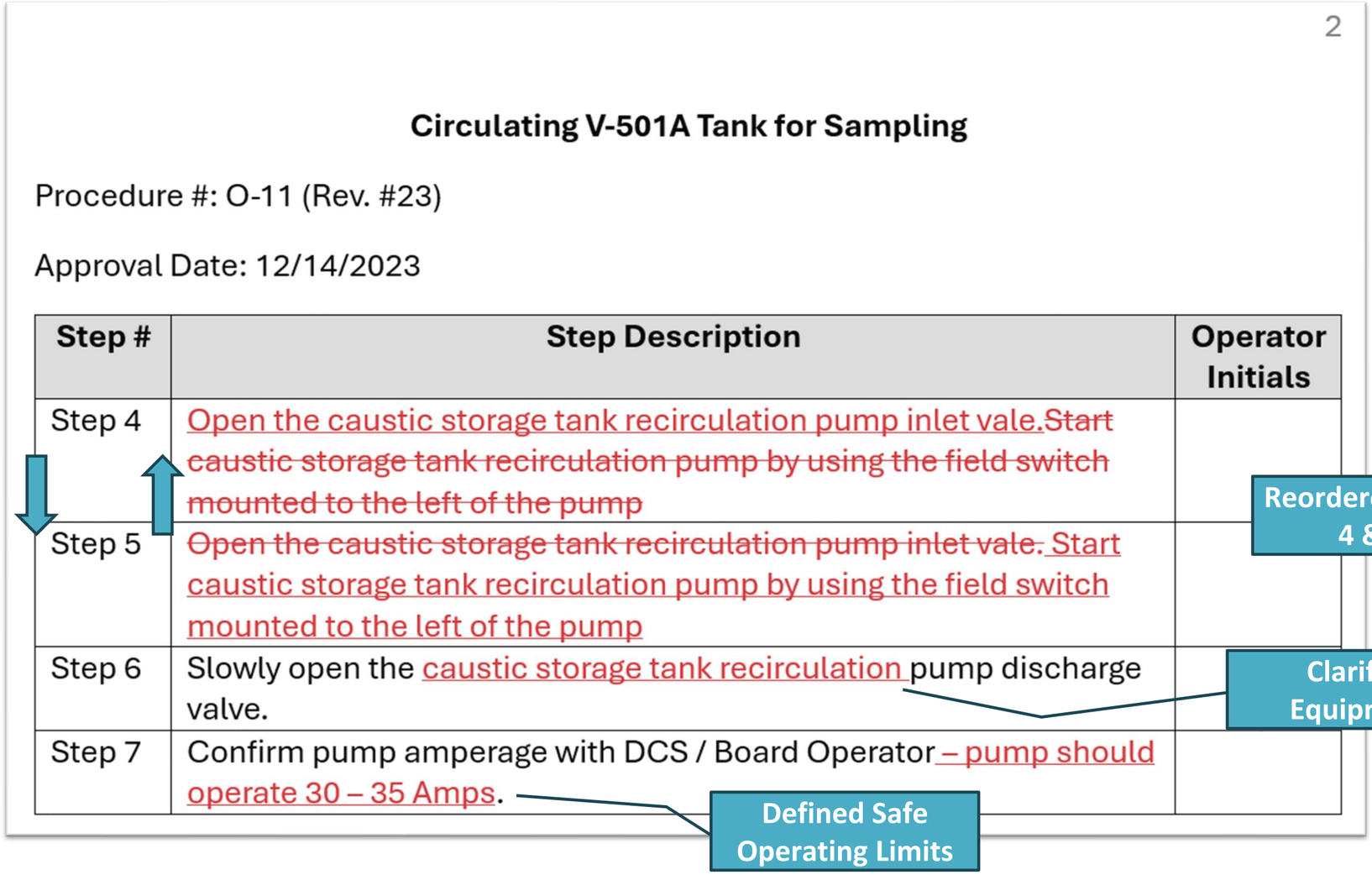
MOC – Policy or Procedural Examples

- MOC process used extensively to update Policies or Procedures

- This example highlights changes requiring Technical Review and communication to affected personnel



2

Circulating V-501A Tank for Sampling

Procedure #: O-11 (Rev. #23)

Approval Date: 12/14/2023

Step #	Step Description	Operator Initials
Step 4	Open the caustic storage tank recirculation pump inlet vale.~~Start caustic storage tank recirculation pump by using the field switch mounted to the left of the pump~~	
Step 5	~~Open the caustic storage tank recirculation pump inlet vale.~~ Start caustic storage tank recirculation pump by using the field switch mounted to the left of the pump	
Step 6	Slowly open the caustic storage tank recirculation pump discharge valve.	
Step 7	Confirm pump amperage with DCS / Board Operator – pump should operate 30 – 35 Amps.	

MOC – Personnel / Staffing Example

- Typically used for Technical Staff transitions (Area Engineer, Area Supervisor, etc.)
- Serves as a communication tool to all area personnel (affected persons)
- Often used to document new employee training, action item transfer, and document familiarity with process safety fundamentals

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MOC – Action Item Best Practices

- Company MOC Policy should provide framework for Action Item completion time constraints
  - Consider building flexibility (e.g., some Action Items may have to wait until the next scheduled facility outage)
- Critical for MOC Final Approver to assess “Before” & “After” In-Service Action Items for appropriateness
- An electronic MOC Tool may be used to help understand company-wide metrics (e.g., number of “open” Action Items by facility, average time to complete, etc.)

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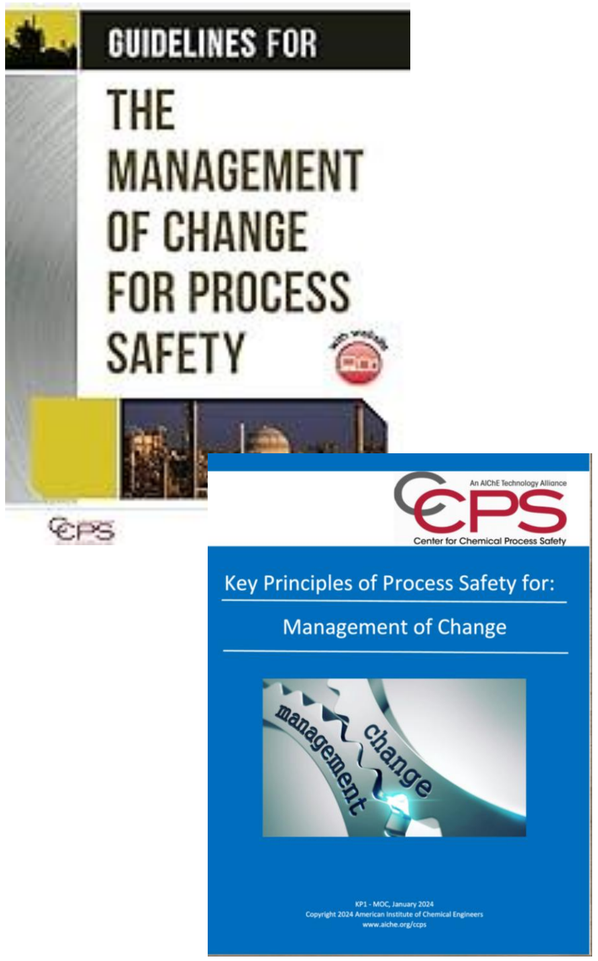
North American Requirements & Resources

Process Safety Management (PSM)

- **29 CFR 1910.119** Process Safety Management of Highly Hazardous Chemicals
- Appendix C to 1910.119 Compliance Guidelines and Recommendations *(Nonmandatory)*, Section 11: “Managing Change”
- What is Management of Change (MOC)? - Describes the concept of Management of Change, when it is used, its benefits, and related best practices from the Washington State Department of Labor and Industries, Undated.

Center for Chemical Process Safety (CCPS)



These resources available from CCPS:

- **Guidelines for Management of Change for Process Safety;** AIChE/CCPS, 2008; Wiley Interscience
- Key Principles of Process Safety for: Management of Change, 2024
- Various presentations and webinars
- AIChE eLearning Course

Chemical Safety and Hazardous Investigation Board (CSB)

- Government agency that investigates incidents and issues public reports **and videos** with lessons learned
- Select investigations:
  - La Porte, TX Fatality - Section 6 …Missing MOCs
  - Texas City, TX Refinery Explosion - Section 3 …Procedural Changes without MOCs

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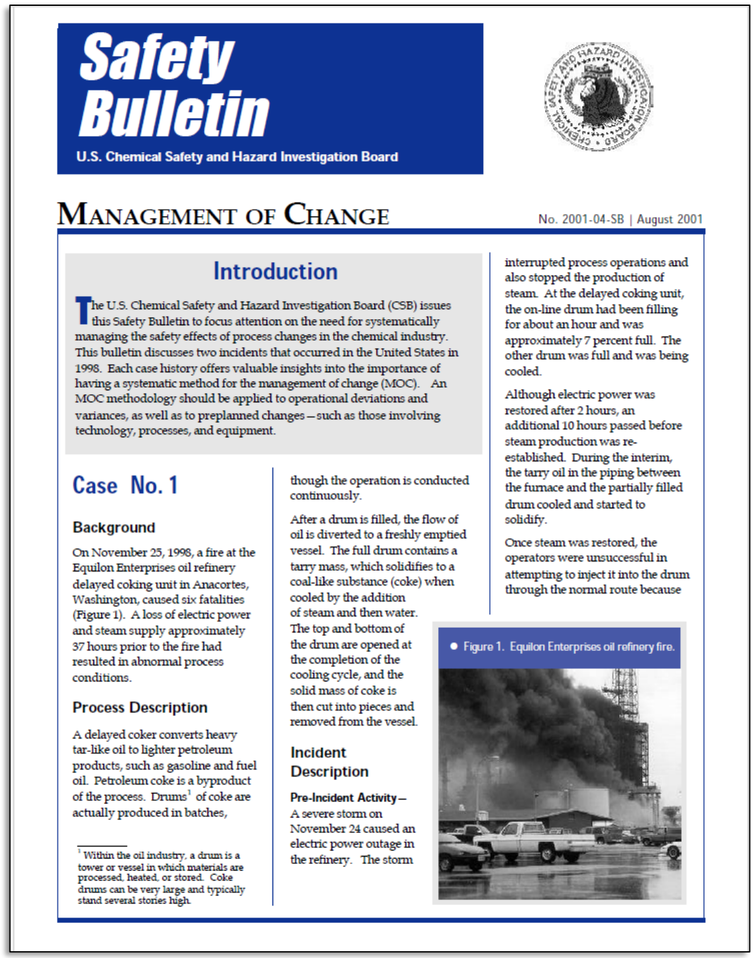
CSB

www.csb.gov

CSB MOC Bulletin



Safety Bulletin

U.S. Chemical Safety and Hazard Investigation Board

MANAGEMENT OF CHANGE

No. 2001-04-SB | August 2001

Introduction

The U.S. Chemical Safety and Hazard Investigation Board (CSB) issues this Safety Bulletin to focus attention on the need for systematically managing the safety effects of process changes in the chemical industry. This bulletin discusses two incidents that occurred in the United States in 1998. Each case history offers valuable insights into the importance of having a systematic method for the management of change (MOC). An MOC methodology should be applied to operational deviations and variances, as well as to preplanned changes—such as those involving technology, processes, and equipment.

Case No. 1

Background

On November 25, 1998, a fire at the Equilon Enterprises oil refinery delayed coking unit in Anacortes, Washington, caused six fatalities (Figure 1). A loss of electric power and steam supply approximately 37 hours prior to the fire had resulted in abnormal process conditions.

Process Description

A delayed coker converts heavy tar-like oil to lighter petroleum products, such as gasoline and fuel oil. Petroleum coke is a byproduct of the process. Drums[1] of coke are actually produced in batches, though the operation is conducted continuously.

After a drum is filled, the flow of oil is diverted to a freshly emptied vessel. The full drum contains a tarry mass, which solidifies to a coal-like substance (coke) when cooled by the addition of steam and then water. The top and bottom of the drum are opened at the completion of the cooling cycle, and the solid mass of coke is then cut into pieces and removed from the vessel.

Incident Description

Pre-Incident Activity—A severe storm on November 24 caused an electric power outage in the refinery. The storm interrupted process operations and also stopped the production of steam. At the delayed coking unit, the on-line drum had been filling for about an hour and was approximately 7 percent full. The other drum was full and was being cooled.

Although electric power was restored after 2 hours, an additional 10 hours passed before steam production was re-established. During the interim, the tarry oil in the piping between the furnace and the partially filled drum cooled and started to solidify.

Once steam was restored, the operators were unsuccessful in attempting to inject it into the drum through the normal route because

Figure 1. Equilon Enterprises oil refinery fire.

[1] Within the oil industry, a drum is a tower or vessel in which materials are processed, heated, or stored. Coke drums can be very large and typically stand several stories high.

- Features two 1998 case studies. Select takeaways:
  - Deviations from standard operating conditions / adequate procedures
  - Process technology changes (catalyst) created reactor plugging and clearing challenges resulting in task miscommunication
  - Authorize change at a level commensurate with risk and hazards

[Management of Change | CSB Safety Bulletin]

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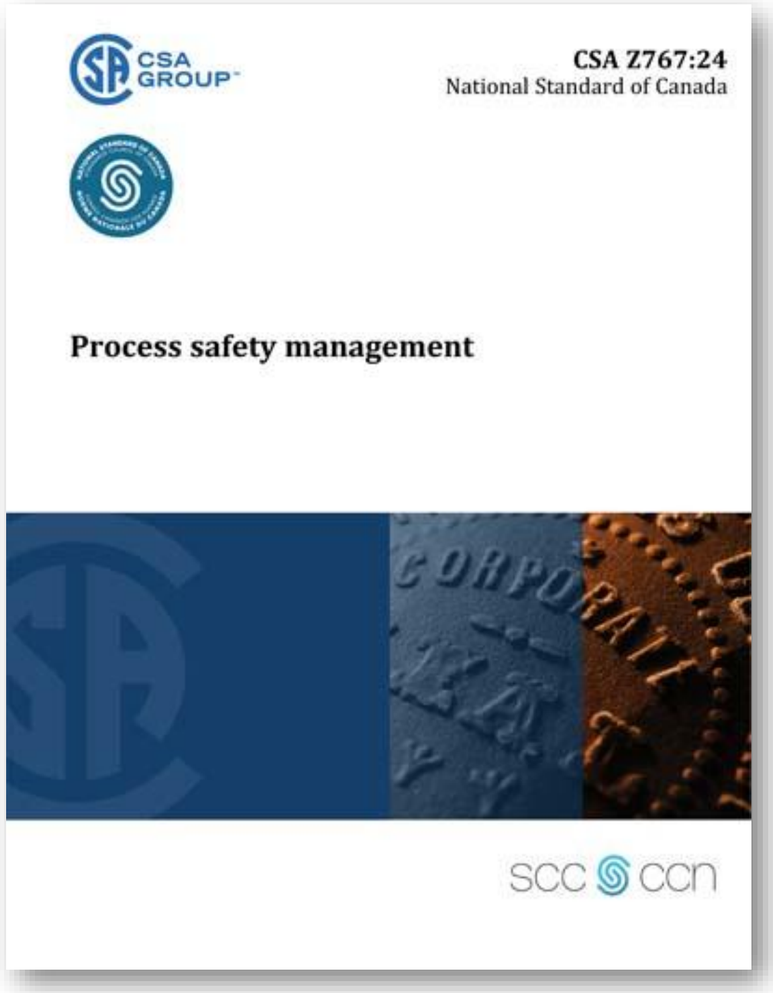
Canadian Framework for Managing Change



- Less explicit regarding “Management of Change,” however, WHMIS and OHS emphasize hazard assessment and risk management
  - Provincial / local regulation may vary
- Voluntary Process Safety Standard CSA Z767 not adopted into law but acts as due diligence document and lists Management of Change as a core element

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In closing…

- Strong management of change processes increase safety
- Effective management of change is dependent on:
  - Hazard and change identification
  - Subject Matter Experts' careful review of the change and its consequences
  - Appropriate change documentation
  - Training of affected persons
- Required by many regulating entities
- Many resources available from reputable sources

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THANK YOU
FOR YOUR ATTENTION

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