

MANAGEMENT OF CHANGE: AN OVERVIEW

North Jersey Section AIChE

WHO AM I?

- Peter Sibilski, P.E., CEM, FAIChE
- Plant Manager, Pharmetic Manufacturing Co., LLC
- B.S., Chemical Engineering - NJIT
- MBA, Technology Management - University of Phoenix
- Work experience includes:
 - Diamond Shamrock – specialty chemicals
 - Occidental Chemical – specialty chemicals
 - Henkel Chemical – specialty chemicals
 - Olin Hunt – microelectronics chemicals
 - EI Associates – A/E consulting
 - BOC Gases – industrial gases
 - Schering-Plough - pharmaceuticals
 - ALZO International, Inc. – specialty chemicals

ATTRIBUTION



Information presented on these slides was obtained from:

- **An Engineer's Guide to Management of Change – R. Wayne Garland, CEP Magazine, March 2012**
- *...as well as over 30 years of experience in the chemical process industry!*

WHY DO WE NEED “MANAGEMENT OF CHANGE”?



<http://www.youtube.com/watch?v=8A1xSCUtB-M>

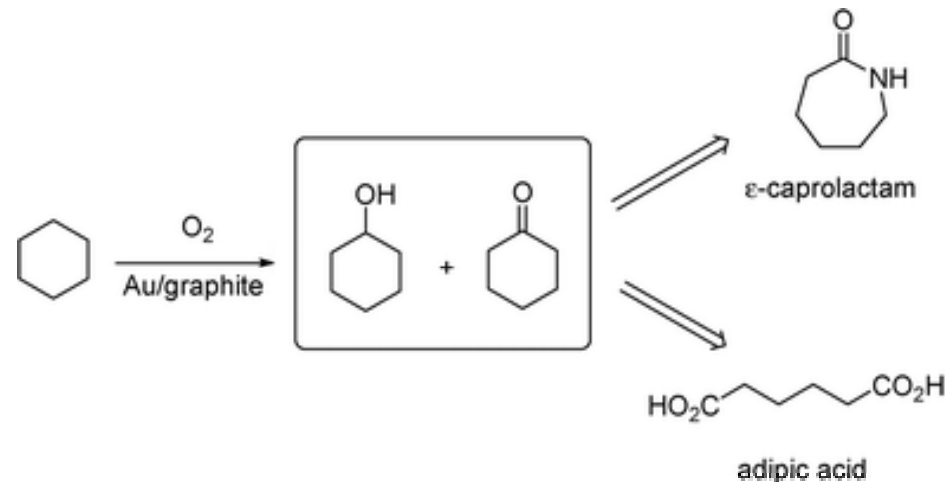
FLIXBOROUGH, ENGLAND 1974

- On June 1, 1974, an explosion at a chemical plant near the village of Flixborough, England killed 28 people and seriously injured 26



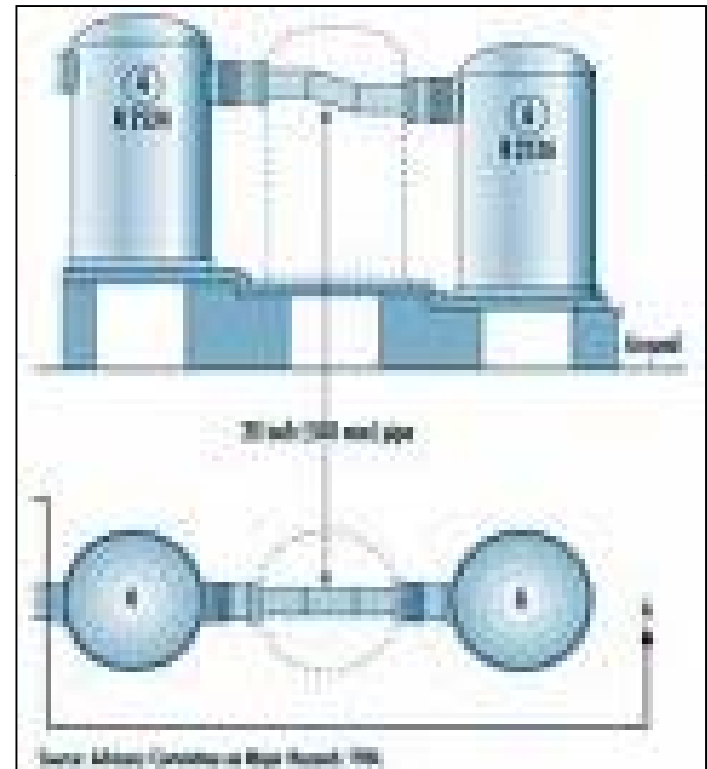
FLIXBOROUGH, ENGLAND 1974

- The chemical plant was owned by Nypro (UK) and had been in operation since 1967, producing Caprolactam, a chemical used in the production of Nylon
- The process involved in the accident was an oxidation of cyclohexane with air in a series of 6 reactors, producing a mixture of cyclohexanol and cyclohexanone:



FLIXBOROUGH, ENGLAND 1974

- Two months prior to the explosion, a crack was discovered in the # 5 reactor
- A temporary 50 cm (20 inch) diameter pipe was installed to bypass the leaking reactor to allow repairs to be made without interrupting production



FLIXBOROUGH, ENGLAND 1974

- At 4:53 pm on Saturday, June 1, 1974, the temporary bypass pipe (containing cyclohexane at 150°C and 1 MPa) ruptured, possibly as a result of a fire on a nearby 8 inch pipe, which had been burning for nearly an hour
- Within about 1 minute, approximately 40 tons of cyclohexane leaked from the pipe and formed a vapor cloud an estimated 100-200 meters in diameter
- The vapor cloud exploded, completely destroying the plant*
 - ** Ignition source was probably a furnace at a nearby hydrogen plant*

FLIXBOROUGH, ENGLAND 1974

- The force of the explosion was estimated to be the equivalent of about 15 tons of TNT
- All 18 control room employees were killed, 9 other site workers were killed, and 1 delivery driver died in his truck of a heart-attack
- If the explosion occurred on a weekday, the casualties could've been upwards of 500 people
- Resulting fires raged in the area for 10 days
- The blast was heard up to 25 miles away

FLIXBOROUGH, ENGLAND 1974

- It was determined that the bypass pipe had failed due to unanticipated lateral stresses during a pressure surge
 - *The bypass pipe had not been designed by engineers experienced in high-pressure piping design*
 - *No plans or calculations were produced*
 - *The pipe was not pressure tested before use*
 - *The pipe was mounted on temporary scaffolding poles that allowed it to twist under pressure*

MANAGEMENT OF CHANGE



- **What is the (OSHA) definition of change?**
 - **What are some common types of changes?**
 - **Why do we need a management of change process?**
 - **What is the basic MOC workflow process?**
 - **What are the keys to a successful MOC Program?**
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DEFINITION OF CHANGE

- **In the context of OSHA’s Process Safety Management world:**

...change includes all modifications to equipment, procedures, raw materials, and processing conditions other than “replacement in kind”.



TYPES OF CHANGES

1. Facility Changes:

- *These include any modifications made to the equipment*

2. Control System Changes:

- *These include changes to the programming or control logic, including who has access to the logic*

3. Information System Changes:

- *These include changes to raw material specifications resulting in the replacement of a chemical*

4. Procedural Changes:

- *These include any changes to previously established safety, quality or operating limits*
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WHY IS MOC PROCESS NEEDED?

- The story of “Sam Shortcut”



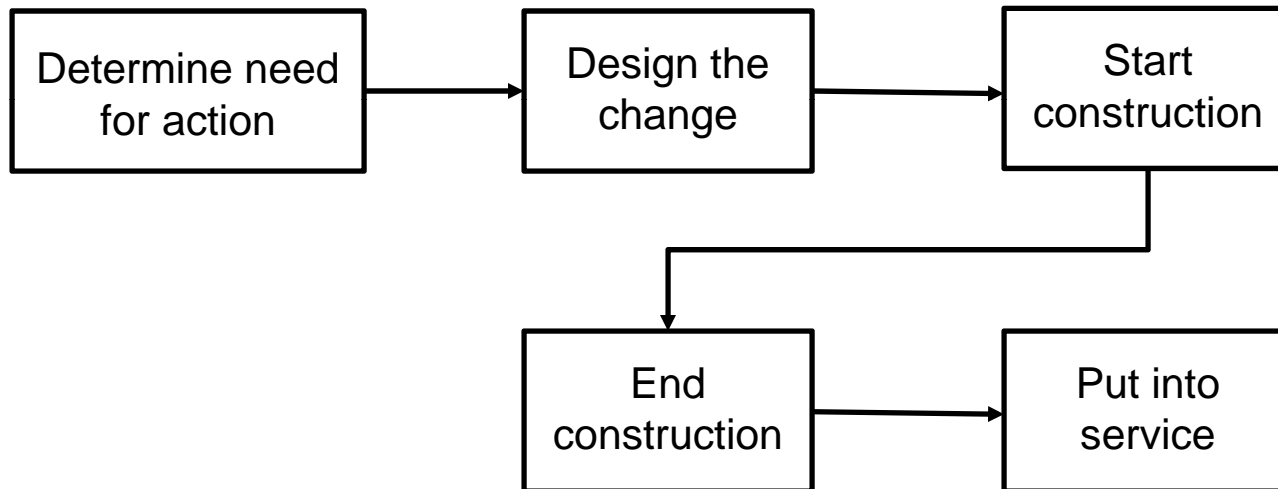
SAM SHORTCUT'S PROJECT



- **A facility change is needed:**
 - *Alter some piping and a control valve to re-route a conveyor system to an existing storage bin (Bin 99), that is currently not in service*
- Because of the simplicity of the project, (and because he's already over-worked), Sam decides to by-pass the MOC process and gets the alterations done by the area mechanics and electricians

SAM SHORTCUT'S PROJECT

- Simple project workflow process:



SAM SHORTCUT'S PROJECT



- **Sam is proud of his efficiency until.....**
 - *The material transfer operator cannot get product to go into Bin 99*
 - *The area operations manager has a quality problem because material was transferred to the wrong bin*
 - *An operator returning from vacation uses the old targets for the process variables because he was unaware of the changed targets for the new product*
 - *The area operations manager is upset again because there has been an accidental discharge – the primary level sensor on the bin failed and there was no back-up*
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SAM SHORTCUT'S PROJECT



- **Sam is proud of his efficiency until.....**
 - *The shift team manager is concerned about the relief device on Bin 99 cycling frequently and possibly releasing inert gas into the production area*
 - *The pressure vessel inspector becomes aware of the change and believes the state codes for pressure vessels could apply – he asks Sam if the bin is rated for the new operating pressure and if the relief device is set correctly*

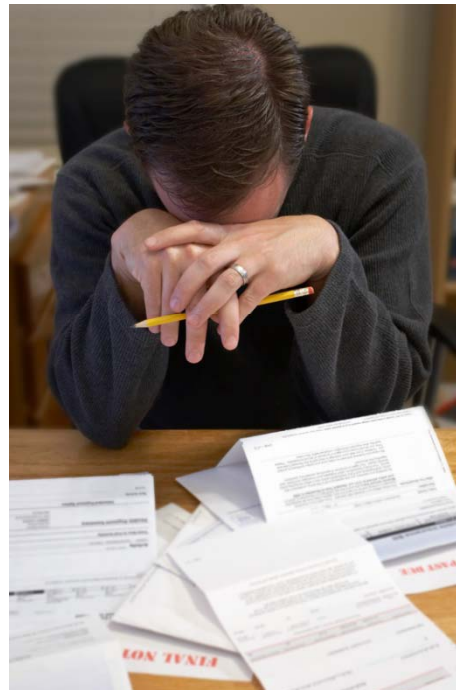
SAM SHORTCUT'S PROJECT



- **Sam is proud of his efficiency until.....**
 - *The environmental coordinator becomes aware of the frequent relief valve cycling and is concerned that it could be a violation of the environmental permit*
 - *Sam returns to work on a Monday morning and gets a call from a control system mechanic that there was a problem in material transfer that shut down production for the weekend. The electricians trouble-shooting the problem could not locate the source because the drawings were not up-to-date and did not reflect the recent changes to Bin 99*

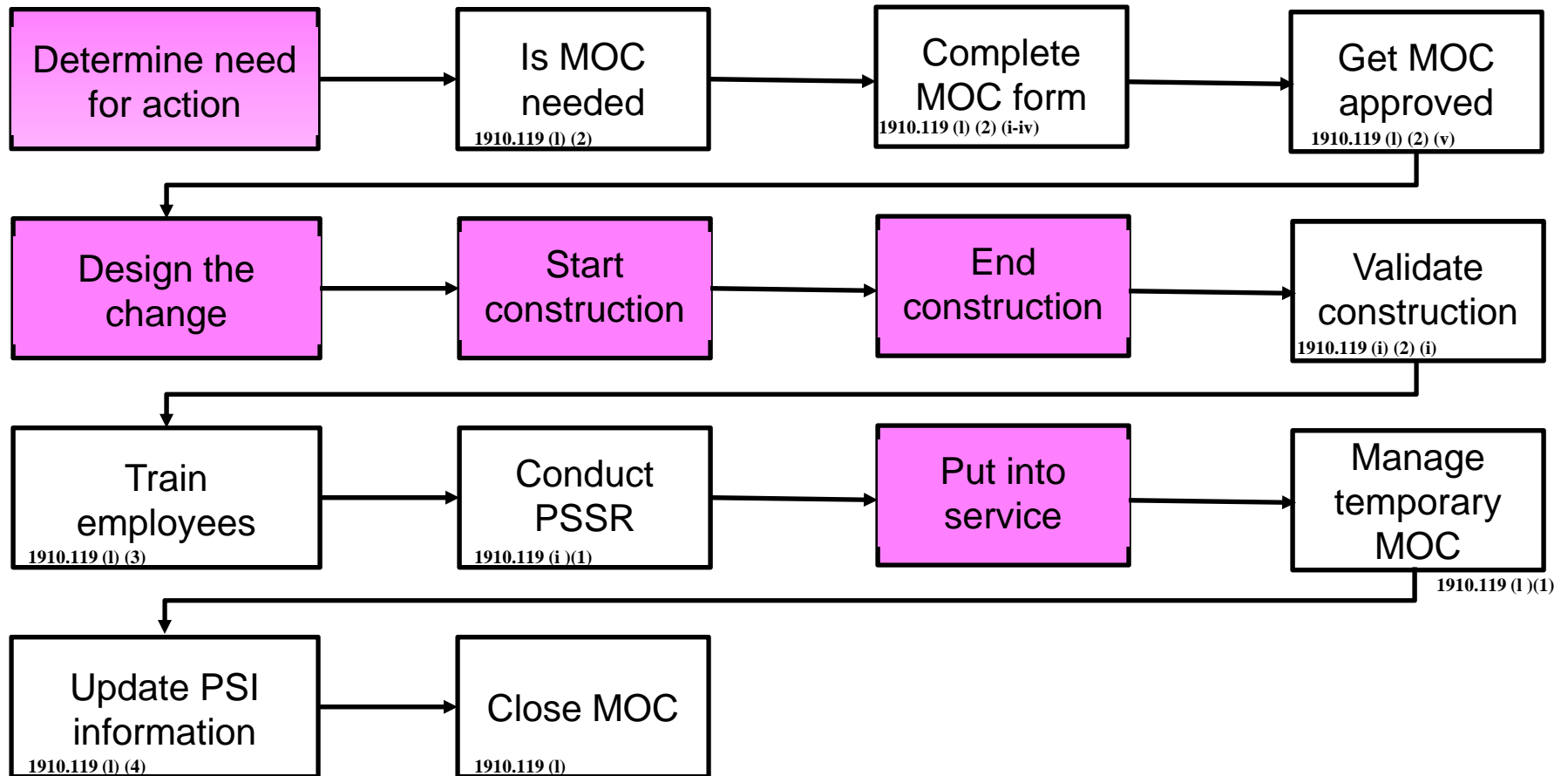
SAM SHORTCUT'S PROJECT

- Sam is proud of his efficiency until.....
 - He unfortunately acquires the new nickname: **“Bin 99 Engineer”**



WHY IS MOC PROCESS NEEDED?

- **Management of Change workflow process:**



KEYS FOR SUCCESSFUL MOC



- **Personnel training**
 - **Change should be managed, not just documented**
 - **Clearly defined role responsibilities for MOC process**
 - **Communication**
 - **Regular audits of the process**
 - **Management expectations that MOC process will be followed all the time**
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TEST YOUR KNOWLEDGE



- **What is an example of the (OSHA) definition of change?**
 - A. Adding a new control valve
 - B. Relocating an electrical outlet or light fixture in an office area
 - C. Modifying an operating procedure to correct misspelled words
 - D. An emergency action in response to an accidental discharge, which is discontinued immediately upon termination of the emergency
 - E. Replacing a worn-out valve with a new, essentially identical valve that meets the same specifications
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TEST YOUR KNOWLEDGE

- **What is an example of the (OSHA) definition of change? ANSWER:**
 - A. Adding a new control valve
 - B.
 - C.
 - D.
 - E.

MOC covers alterations to manufacturing processes that are not replacement-in-kind. Alterations to office areas, editorial changes, or certain emergency actions are not subject to MOC

TEST YOUR KNOWLEDGE



- **What is NOT an example of the (OSHA) definition of change?**
 - A. Temporarily by-passing an interlock
 - B. Using a different schedule of pipe in a pipeline than what is called for in the current piping specification for that service
 - C. Adding a new nozzle to a tank
 - D. Changing a temperature target or alarm limit within the range defined in a standard operating procedure or control strategy
 - E. Adding a new step to an operating procedure

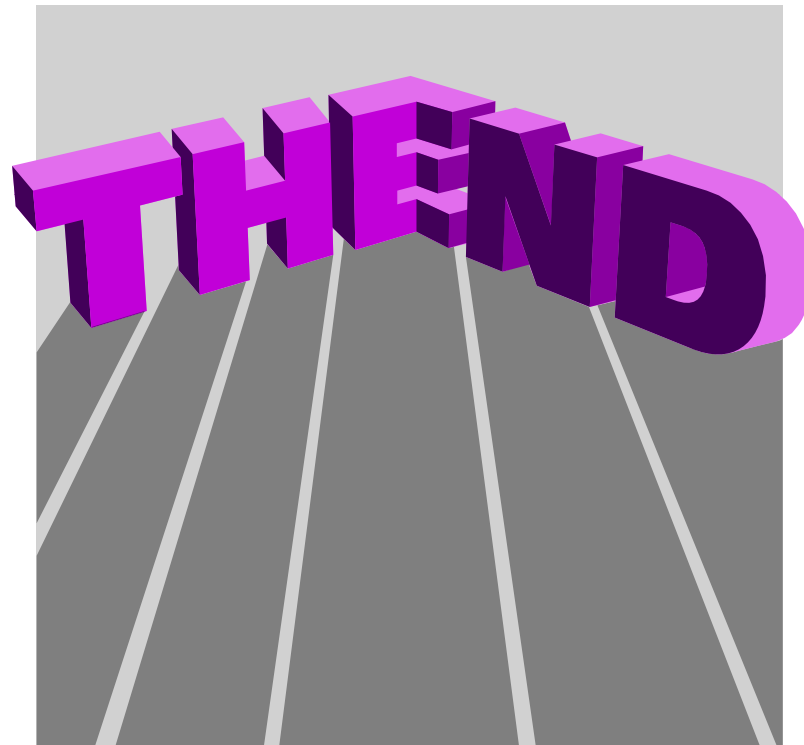
TEST YOUR KNOWLEDGE



- **What is NOT an example of the (OSHA) definition of change? ANSWER:**
 - A.
 - B.
 - C.
 - D. Changing a temperature target or alarm limit within the range defined in a standard operating procedure or control strategy
 - E.

If safe operating limits are defined in a standard operating procedure, process set-points can be changed within that range without the need for MOC. If the set-point is being changed to a value that is outside of the pre-approved safe operating limits, then MOC should be used.

IN CONCLUSION...



"There is no expedient to which a man will not resort to avoid the real labor of thinking."

Sir Joshua Reynolds



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