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:


- …as well as over 30 years of experience in the chemical process industry!

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WHY DO WE NEED “MANAGEMENT OF CHANGE”?

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

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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:

![Chemical reaction diagram]
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

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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”.

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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*
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:

1. Determine need for action
2. Design the change
3. Start construction
4. End construction
5. Put into service

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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

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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 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:

1. Determine need for action
2. Is MOC needed
3. Complete MOC form
4. Get MOC approved
5. Design the change
6. Start construction
7. End construction
8. Validate construction
9. Train employees
10. Conduct PSSR
11. Put into service
12. Manage temporary MOC
13. Update PSI information
14. Close MOC

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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
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. Temporarily by-passing an interlock
B. Using a different schedule of pipe in a pipeline than what is called
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

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.

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IN CONCLUSION…

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“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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