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Benchmarking Management of Change Practices in the Process Industry

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ABSTRACT

Management of Change (MOC) is a relatively recent procedure that was mandated by the OSHA Process Safety Management (PSM) regulation. The performance-oriented nature of the PSM regulation allows for a wide variety of procedures or practices, which have been implemented in an attempt to comply with the MOC section of the PSM regulation.

A benchmarking project was recently carried out by the Mary Kay O'Connor Process Safety Center in order to determine the baseline for various MOC activities. A questionnaire about MOC practice was sent to over 50 chemical and petroleum refining companies. The object of the questions was to identify the diversity of MOC application within the chemical processing industry. This paper presents the results of this benchmarking study.

Benchmarking MOC Practices in the Process Industry

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ABSTRACT

Chemical, oil, and gas plants process many potentially hazardous chemicals. Historically, a variety of measures have been used for hazard reduction and risk management. However, a number of catastrophic chemical incidents can be attributed to process changes handled incorrectly. During the last decade, federal regulations have been promulgated in the United States mandating a well-defined administrative procedure for management of change as a key element of a process safety management system. OSHA's process safety management program and EPA's risk management program provide the baselines and framework for development of management of change programs. Due to the performance-based nature of these regulatory requirements, there is wide variation in management of change programs and practices. This paper summarizes the results of a benchmarking exercise aimed at identifying the diversity of implementation practices in industry.

INTRODUCTION

Changes and modifications in chemical plants are essential for survival in the dynamic process industry. These changes and modifications are needed for a variety of reasons, i.e., yield improvement, compensation for unavailable equipment, production increases, increases in storage capacity, cost reduction, safety improvements, and pollution prevention. The process changes usually involve changes in operating procedures; changes in piping, equipment, or materials of construction; as well changes in feedstocks, catalysts, fuels, or their method of delivery. However, a number of catastrophic incidents have been attributed to improperly handled process changes[1,2,3,4,5].

The Occupational Safety and Health Administration's (OSHA) process safety management (PSM) regulation[6] and the US Environmental Protection Agency's (EPA) risk management program (RMP) regulation[7] both require regulated facilities to develop and implement management of change (MOC) programs. Both the regulations are similar and performance-based. The MOC requirements as specified in the OSHA PSM regulation are produced below in its entirety in Table 1[1].

[1] The MOC requirements of the EPA RMP regulation are similar to the OSHA PSM requirements.

Table 1: Management of Change Requirements – OSHA PSM Regulation

29 CFR 1910.119(l) Management of change.

(l)(1)The employer shall establish and implement written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment, and procedures; and, changes to facilities that affect a covered process.

(l)(2)The procedures shall assure that the following considerations are addressed prior to any change:
(l)(2)(i) The technical basis for the proposed change;
(l)(2)(ii) Impact of change on safety and health;
(l)(2)(iii) Modifications to operating procedures;
(l)(2)(iv) Necessary time period for the change; and,
(l)(2)(v) Authorization requirements for the proposed change.

(l)(3) Employees involved in operating a process and maintenance and contract employees whose job tasks will be affected by a change in the process shall be informed of, and trained in, the change prior to start-up of the process or affected part of the process.

(l)(4) If a change covered by this paragraph results in a change in the process safety information required by paragraph (d) of this section, such information shall be updated accordingly.

(l)(5) If a change covered by this paragraph results in a change in the operating procedures or practices required by paragraph (f) of this section, such procedures or practices shall be updated accordingly.

The performance-based nature of the MOC element is apparent from a reading of the regulatory requirements shown in Table 1. Thus it is difficult to claim with certainty what is meant by regulatory compliance[8,9]. Practices often vary and there is a critical need to determine the industry consensus or Recognized and Generally Accepted Good Engineering Practices (RAGAGEP). This is true not only in the case of management of change but also in the case of other elements of the process safety management program. This effort is thus aimed at developing a benchmark of industry practices for different process safety management requirements. Management of change because of the wide variation in application is was one of the first elements chosen for analysis. In the future, similar exercises will be conducted for other elements of the PSM program. Quite likely, benchmarking exercises may be repeated on the same elements (e.g., management of change) as practices change. Note that with new technologies and other advances, RAGAGEP will remain a moving target with the need for continual benchmarking and determination of RAGAGEP as they apply to the current timeframe.

A questionnaire was prepared and distributed to more than 50 plants, out of which 26 facilities responded. The questionnaire is reproduced in its entirety in Table 2.

Table 2: Questionnaire for Benchmarking Management of Change

Management of Change (MOC) is a relatively recent procedure that was mandated by the OSHA Process Safety Management regulation. The objective of the questions contained herein is to identify the diversity of MOC application within the chemical processing industry. A copy of the report resulting from this project will be provided to all the participants.

This benchmarking questionnaire is targeted towards 24-hour continuous operation single site facilities. Please return the questionnaire with appropriate notations if these assumptions are not correct.

1 Facility Size and Type

1.1. How many employees (including contractors) work at this site? For uniformity, include everyone on the payroll, including the administrative and contract personnel.

_____

1.2. How many separate process areas are within the plant complex?

_____

1.3. Which of the following best characterizes the process operations at this site? (Check only one)

- ☐ Chemical
- ☐ Refining
- ☐ Petrochemical
- ☐ Pharmaceutical
- ☐ Food
- ☐ Gas Plant
- ☐ Other (please specify_____)

2 Scope

2.1. Is MOC applied plant-wide or only for regulatory "covered" process areas? (Check only one)

- ☐ Plant-wide
- ☐ Regulatory "covered" process areas

2.2. Is MOC applied to atmospheric tank farm areas? (Check only one)

- ☐ Yes
- ☐ No

2.3. Is MOC applied to utilities, such as steam generation or waste-water treatment areas? (Check only one)

- ☐ Yes
- ☐ No

2.4. Are there any process areas within your plant that are NOT subjected to formal MOC procedures? (Check only one)

- ☐ Yes Describe_____
- ☐ No

3 Policy Development

3.1. Was the MOC policy and procedures developed by corporate staff and then introduced to each plant? (Check only one)

- ☐ Yes
- ☐ No

3.2. Was the MOC policy and procedures developed by local plant staff? (Check only one)

- ☐ Yes
- ☐ No

3.3. Were PSM consultants used to initially develop MOC policy and procedures? (Check only one)

- ☐ Yes
- ☐ No

3.4. Are MOC procedures consistent plant-wide or vary somewhat within each area of the plant? (Check only one)

- ☐ Consistent plant-wide
- ☐ Vary somewhat within each area of the plant

3.5. Is there any effort to maintain consistent MOC procedures with other plants within the corporation? (Check only one)

- ☐ Yes
- ☐ No

4 Size of MOC program

4.1. How many maintenance work orders (replacement-in-kind) are initiated annually?

_____

4.2. How many MOC's (all MOCs including emergency and temporary MOCs) are initiated annually[1]?

_____

4.3. Do you keep records of MOC's that are <u>not</u> approved? (Check only one)

- ☐ Yes
- ☐ No

4.3.1. If answer to 4.3 is yes, how many MOC's were eventually <u>not</u> approved?

_____

5. Emergency MOCs

5.1. How many emergency MOC's are initiated annually[1]?

_____

5.2. Who approves emergency MOC's?

_____

5.3. How long does it take to get approval of an emergency MOC?

_____

5.4. Are emergency MOC's audited/checked as soon as practicable? (Check only one)

- ☐ Yes
- ☐ No

How many emergency MOC's require remedial actions or violate the company/site MOC procedures?

Table 2: Questionnaire for Benchmarking Management of Change (continued)

6. Temporary MOCs
   6.1. How many temporary MOC's are initiated annually[1]?
   _____
   6.2. Who checks to see if the changes affected by the temporary MOCs are restored to their normal conditions after the expiration of the authorized time period?
   _____
   6.3. Are temporary MOCs audited/checked as soon as practicable do determine if the change has been restored to the original condition? (Check only one)
   - ☐ Yes
   - ☐ No

7. MOC records management
   7.1. Are MOC files maintained in a plant central records storage area or within each respective plant area? (Check only one)
   - ☐ Plant central records storage area
   - ☐ Within each respective plant area

   7.2. Are MOC files maintained electronically or does a paper copy exist? (Check only one)
   - ☐ MOC files maintained electronically
   - ☐ Paper copy
   - ☐ Both

   7.3. Who is responsible for maintaining MOC files? (Check only one)
   - ☐ Safety
   - ☐ Operations
   - ☐ Maintenance
   - ☐ Other_____

8. Audit
   8.1. Have there been additional audits of the MOC program beyond the standard required 3-year PSM audit? (Check only one)
   - ☐ Yes
   - ☐ No

   8.2. Is the PSM Audit conducted by corporate staff not normally located at the plant? (Check only one)
   - ☐ Yes
   - ☐ No

   8.3. Were outside consultants involved in the Audit? (Check only one)
   - ☐ Yes
   - ☐ No

9. Audit Results
   9.1. Did the Audit reveal any MOCs were mis-classified? (Check only one)
   - ☐ Yes (if possible indicate approx % of MOCs audited which had issue _____%)
   - ☐ No

   9.2. Did the Audit reveal any field changes that were not subjected to MOC procedures? (Check only one)
   - ☐ Yes (if possible indicate approx % of MOCs audited which had issue _____%)
   - ☐ No

   9.3. Did the Audit reveal any maintenance work orders that should have been classified as MOC's? (Check only one)
   - ☐ Yes (if possible indicate approx % of MOCs audited which had issue _____%)
   - ☐ No

   9.4. Were there any recommendations for upgrading your MOC program from the latest audit? (Check only one)
   - ☐ Yes
   - ☐ No

   9.4.1. If so, what were these recommendations?
   _____
   _____
   _____

10. MOC software
   10.1. Do you use any special software to facilitate the MOC procedure? (Check only one)
   - ☐ Yes
   - ☐ No

   10.2. Was this software developed in-house? (Check only one)
   - ☐ Yes
   - ☐ No

   10.3. If commercial software is used, is it satisfactory? (Check only one)
   - ☐ Yes (List name of software used_____)
   - ☐ No

11. MOC Program Awareness Training
   11.1. How are new employees and contractor employees made aware of the MOC policy and procedures? (Check all that apply)
   - ☐ Formal training classes
   - ☐ Provided with policy manual
   - ☐ Informal toolbox safety meetings
   - ☐ Other_____

   11.2. If training classes are provided, how often are classes scheduled?
   _____

   11.3. Is MOC training separate from PSM program awareness training? (Check only one)
   - ☐ Yes
   - ☐ No

   11.4. Is a video describing the need for MOC used within your MOC awareness training program (such as the video available from Roy Sanders of Lake Charles)? (Check only one)
   - ☐ Yes (List name of material used_____)
   - ☐ No

Table 2: Questionnaire for Benchmarking Management of Change (continued)

12. Impact on Risk Management Plan

Section 68.36(b) of the EPA RMP regulation states

"If changes in processes, quantities stored or handled, or any other aspect of the stationary source might reasonably be expected to increase or decrease the distance to the endpoint by a factor of two or more, the owner or operator shall complete a revised analysis within six months of the change and submit a revised risk management plan...."

12.1. Who is responsible for checking changes requiring an MOC for impact on the RMP plan? (Check only one)

- ☐ Safety
- ☐ Environmental
- ☐ Corporate Specialist
- ☐ Other_____

12.2. Have any change requiring an MOC ever caused an RMP update?

_____

13. MOC initiation

13.1. Do **all** work orders require a corresponding MOC authorization number or explanation "why MOC is not required"? (Check only one)

- ☐ Yes
- ☐ No

13.2. Who is responsible for identifying a work order is NOT a replacement–in–kind, and is therefore work that requires an MOC? (Check only one)

- ☐ Safety
- ☐ Operations
- ☐ Maintenance
- ☐ Other_____

13.3 Are DCS software changes documented using the MOC procedure? (Check only one)

- ☐ Yes
- ☐ No

13.3.1 If so, Who maintains the DCS software change documentation (Check only one)

- ☐ Operations
- ☐ Engineering (DCS specialists)
- ☐ Other (provide function name _____)

14. PHA revalidation

14.1. What criteria are used to determine whether or not a PHA must be performed with an MOC?

_____

_____

_____

14.2. Do PHA's performed for MOC's vary in the degree of detailed review and documentation (If yes, please explain)?

- ☐ Yes (_____

  _____

  _____

  _____)
- ☐ No

14.3. Did the PHA revalidation team review MOC records? (Check only one)

- ☐ Yes
- ☐ No

14.4. Did the PHA revalidation team find any changes that were not identified in the MOC records? (Check only one)

- ☐ Yes (if possible indicate approx % of MOCs audited which had issue _____%)
- ☐ No

15. Environmental and Quality

15.1. Are environmental staff consulted as part of the MOC review? (Check only one)

- ☐ Yes
- ☐ No

15.2. Is the plant accredited under ISO 9000? (Check only one) (ask same question for ISO 14000)

- ☐ Yes
- ☐ No

15.3. Is the PSM MOC program consolidated with the Quality configuration management program? (Check only one)

- ☐ Yes
- ☐ No

15.3.1. If so, are records consolidated? (Check only one)

- ☐ Yes
- ☐ No

Table 2: Questionnaire for Benchmarking Management of Change (continued)

16. Risk Screening or Ranking MOC

(The following group of questions is based upon the concept that proposed MOC's should be screened in order to provide the appropriate resources to evaluate the impact on safety of the proposed change.)

16.1. Does your site use Risk Screening or Ranking of MOCs?
- ☐ Yes
- ☐ No

16.2. Who developed the risk screening procedure?
- ☐ Yes
- ☐ Local in-house staff
- ☐ Corporate PSM staff
- ☐ Outside consultants
- ☐ Other_____

16.3. Who conducts the risk screening? (Check only one)
- ☐ MOC initiator
- ☐ MOC Coordinator

16.4. How many risk categories are available?

_____

16.5. Are potential consequences and potential event frequency evaluated separately in the determination of the appropriate risk category? (Check only one)
- ☐ Yes
- ☐ No

16.5.1 If yes, how is potential consequences and potential event frequency evaluated? (Check only one)
- ☐ Checklists
- ☐ Staff experience only

17. Safety Review of MOC

17.1. If risk screening is used, are different safety review techniques applicable to each MOC risk category? (Check only one)
- ☐ Yes
- ☐ No

17.2. Are checklists available for low risk MOC? (Check only one)
- ☐ Yes
- ☐ No

17.3. Are high-risk MOC categories evaluated within the plant or required to be submitted to corporate safety staff? (Check only one)
- ☐ Evaluated within the plant
- ☐ Submitted to corporate safety staff

18. Authorization

18.1. How many authorizations are required on a MOC request to proceed with the change?

_____

18.2. If risk screening is used, are different authorization levels applicable to each MOC risk category? (Such as authorization at the process unit area or plant manager level.) (Check only one)
- ☐ Yes
- ☐ No

18.3. If risk screening is used, are different number of authorizations applicable to each MOC risk category? (Check only one)
- ☐ Yes
- ☐ No

19. Training in the MOC

19.1. Who is responsible for conducting training regarding the impact of the MOC? (Check only one)
- ☐ MOC coordinator
- ☐ Operations
- ☐ Training department
- ☐ Other (list function _____)

19.2. If risk screening is used, are different types of training requirements applicable to each MOC risk categories? (Check only one)
- ☐ Yes
- ☐ No

19.3. Are night orders or logbook notation used for informing staff of low risk MOC changes? (Check only one)
- ☐ Yes
- ☐ No

20. Pre-Startup Safety Review

20.1. Is the PSSR program considered closure of the MOC program? (Check only one)
- ☐ Yes
- ☐ No

20.2. Who is responsible for conducting the PSSR? (Check only one)
- ☐ Operations
- ☐ MOC coordinator
- ☐ Other_____

20.3. Is startup safety review following turnaround handled separately than PSSR? (Check only one)
- ☐ Yes
- ☐ No

Table 2: Questionnaire for Benchmarking Management of Change (continued)

21. Metrics
    21.1. Have you developed a program to measure MOC effectiveness? (Check only one)
        - ☐ Yes
        - ☐ No
    21.2. Did you develop your own metrics or adapted it from other sources? (Check only one)
        - ☐ Developed own metrics
        - ☐ Adapted metrics from other sources
22. Does your MOC program include management of organizational changes? (Check only one)
        - ☐ Yes
        - ☐ No
    22.1. If answer to question (22) is yes, what is the highest level in your organization that requires a management of organizational change?

    _____
23. Would you be willing to submit a redacted version (deleting all specific references to your organization) of your MOC policy and procedures manual to the Mary Kay O'Connor Process Safety Center for sharing with other companies? (Check only one)
        - ☐ Yes
        - ☐ No
24. Please describe any general impressions of the MOC program at your plant, such as plans to extend the MOC program to other areas, portions of the MOC program that are causing difficulty, suggestion to improve the efficiency of MOC program, etc.

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[1] *Please provide an estimate for 2000 if complete records are available. If complete records for 2000 are not available, please provide an annual average for the most recent year for which complete records are available.*

The plants surveyed had 100 to 1000 employees. Figure 1 shows the distribution of facilities based on the number of employees. The facilities averaged between 6-15 separate process areas, however, one facility had 72 processes. The industries represented consisted of chemicals, refineries, petrochemicals, and gas plants. The distribution of facilities based on type of industry is shown in Figure 2.

Figure 1: No. of Employees

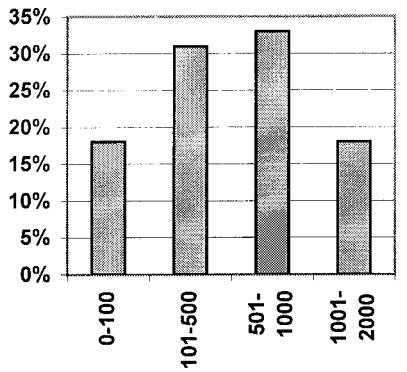
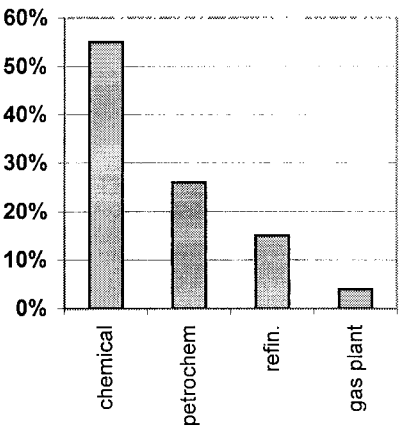


Figure 2: Type of Plants



Scope

A majority of the respondents reported that management of change programs had been implemented "plant-wide". Only 11% of the respondents reported narrow implementation based on determination of regulatory coverage. However, almost all of the respondents reported that atmospheric tank farms and other utilities were being covered by the MOC program. Respondents were asked about MOC exceptions based on the following two groups:

Group A	Group B
Utilities area	Central office building
Portable water station	Q.A laboratories
Nitrogen station	Railcar wash station
Air plant	Environmental areas
Cooling water facilities	

Facilities that implemented a plant-wide (fence-to-fence) MOC program included Group A in the MOC implementation. Group B areas were almost always excluded from MOC implementation. An interesting point made by one of the respondents is that while all areas are subject to MOC procedures, the level of execution and effort varies from area to area.

Policy Development

MOC procedures are almost always developed by local plant staff without external PSM consultant assistance, and without assistance from corporate staff. However, significant

efforts are made to maintain consistent MOC procedures with other plants within the corporation.

Other ways of developing and implementing MOC procedures that had been reported are:

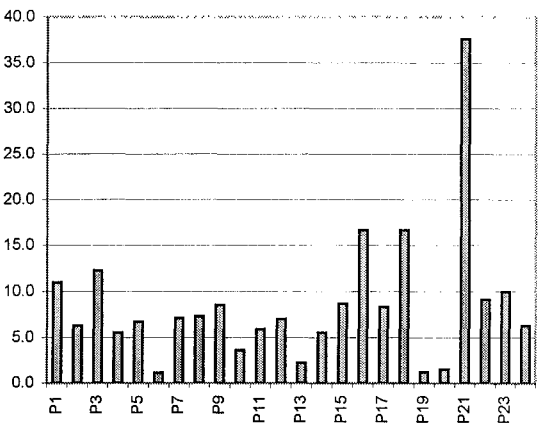
- Corporate staff provides guidelines and the plant develops plant-specific MOC procedures.
- The use of standard plant-wide implementation procedures with varying degrees of compliance.
- The use of MOC procedures from other plant's as guidelines to develop a plant-specific procedure.

Size of MOC Programs

A significant fact revealed by the study was that 25% of the participants could not obtain the number of Maintenance Working Orders (MWO) initiated annually. In addition, another 11% could not estimate the number of MOC orders initiated annually.

Several thousand MWO's are initiated annually in the majority of the plants, but 17,000 and 20,000 MWO's were also reported, though, not by the biggest facilities.

Figure 3: Total Number of Annual MOC's per 10 employees



On the average, each facility initiated several hundred MOC's annually. The number of annual MOC's was normalized in order to obtain typical values independent of facility size. The results are plotted in Figure 3. The average number of MOC's per 10 employees for all the respondents is nine annually. Most of the values vary in the range 5 to 20 MOC's per 10 employees per year. A relatively high value of 37 MOC's per 10 employees was obtained from a small (about 150 employees) facility. An examination of the facility records reveals that it also holds the highest value of annual MWO's per 10 employees. The ratio between the number of annual MWO's initiated and the annual MOC's initiated varies in the range of 10 to 40, with two exception values of 58 and 170 which probably indicates poor MOC implementation. More than half of the respondents indicated that they do not keep records of unapproved MOC's.

Emergency and Temporary Changes

Emergency MOC procedures should be developed for emergency process changes that cannot be postponed. The procedure needs to address the effects caused by the changes; assuming that they will be taken in consideration, and confirm that all documentation will be completed.

35% of the respondent could not recall any emergency MOC's. One of the respondents remarked that there is no need for emergency changes in their facility. In most cases, a few hours were needed to approve emergency MOC's. Figure 4 shows the distribution of emergency and temporary MOC's. 75% of the respondents reported 20 or fewer emergency MOC's annually and 35% of the respondents reported 20 of fewer temporary MOC's. As indicated by the data in Figure 4, one or two facilities reported large number of emergency as well as temporary MOC's. The plant management level responsible for authorizing emergency MOC's varied from plant to plant. The responses revealed that emergency MOC's were authorized by shift superintendent, operations manager, plant manager, and others. In most cases there were multiple authorization requirements. It should be noted that the data revealed a few cases in which a clear division was made between day and off-shift authorization personnel. From the responses, we deduce that there is a high consistency of auditing the emergency changes as soon as practicable. We also deduce that there is high consistency of auditing of temporary changes, so as to restore them to their previous condition. Further analysis of the data provides additional insights. For example, that there was no consistency as to who was responsible for restoration of temporary changes to previous conditions. This task was carried out by the MOC coordinator, the MOC initiator, area leaders, as well as engineering and safety personnel.

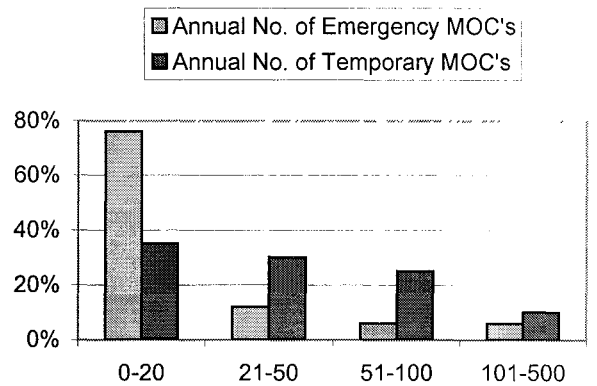
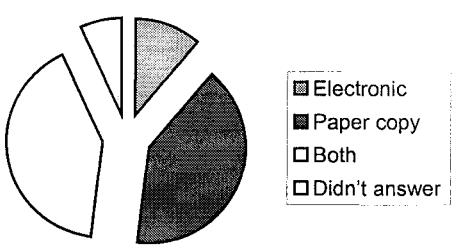


Figure 4: Distribution of Annual Number of Emergency and Temporary MOC's

MOC Record Management

Figure 5 shows the distribution of media used for MOC records management. The responses indicate the preference for storing MOC documentation does not lie within the plant's central area. Further analysis shows that approximately only 40% keep both hard copies and electronic copies of their MOC records, and only about half use electronic files. The most common groups responsible for records maintenance are the PSM group, engineering, or operation.

Figure 5: Distribution of Media used to MOC Record Management



Audit
More than 40% of the respondents apply the minimum standard required by the PSM regulations for audits (i.e., 3-year PSM audit) for auditing MOC programs. About 60% of the participants reported that the audits were conducted by corporate staff and 50% involved external consultants as well. The results from the audits revealed that there was only a small number of miss-classified MWO's that should not have been classified as MOC's. About 74% of the respondents also indicated that their audits identified the need for MOC program upgrades. This finding emphasizes the need for frequent auditing of MOC programs, principally for new PSM management systems. A screening of audit recommendations identified some common "weak links":

- Lack of training
- Demand to apply MOC to organizational changes
- In some cases, revising of the MOC program
- Ambiguity regarding temporary changes

Lack of training was noted quite often and this may point to the need for developing guidelines for MOC training programs or at a minimum, developing requirements for auditing the training programs separately from the PSM training programs.

MOC Software
MOC software products are not commonly used. Two-thirds of the participants do not use software for implementation of Management of Change programs. Of the remaining 33%, only two facilities use commercial software products, while the others use "in-house" software.

MOC Program Awareness Training
56% of the respondents indicated that formal training classes for MOC program awareness are provided for new employees. Some of the same 56% respondents stated that additional MOC program awareness training was provided at other occasions, such as informal safety meetings. Other facilities reported that they offered on-the-job training and/or informal training only. A few facilities reported no training at all, and one facility reported computer-based training only. Formal training classes, wherever provided, were scheduled on a "need-only" basis, while a few respondents reported regular annual training. In general, half of the respondents stated that they provide MOC program awareness training apart from other PSM awareness training. There is no consistency regarding the entity that is responsible for conducting the training - it is uniformly distributed between MOC coordinators, operations, and others.

Impact on Risk Management Plan
The EPA Risk Management Program regulation requires re-submittal of the risk management plan (RMP) within six months of certain changes (e.g., changes which cause the worst-case scenario to increase or decrease by a factor of two). Almost half of the

respondents stated that the safety department was responsible for checking whether a change will result in revising the RMP. Only two facilities indicated process changes that resulted in update and re-submittal of the RMP. One of these was as a result of introduction of a chemical in the process. The other one reported changes in their Off-site Consequence Analysis (OCA). The same facility reported another significant change that resulted in a review of its OCA, but it was decided later that the change did not required the re-submittal of the RMP within six months.

Safety Review of MOC

Safety review of MOC's is mandated by both OSHA and EPA regulations. The optimal stage to initiate a safety review is when preliminary engineering of the change has been completed. Thus, the safety review should take place before the detailed design stage. The survey revealed that most of the facilities that used risk screening of MOC's, used different safety review techniques for different categories of risk. A checklist is most commonly used for low risk MOC's. None of the facilities submit their safety reviews to corporate safety staff for evaluation.

PHA Revalidation

The questionnaire asked for the criteria used by the respondents for making decisions regarding the need for a PHA associated with MOC's. The common criteria for determination of the need for performing PHA are:

- All check points of Change Hazard Review are not satisfied
- Complexity
- New materials
- Changes in the process chemistry
- Changes with a major safety impact

56% of the respondents stated that the level of detail of PHA's varied according to the complexity of the change. Most of the respondents indicated that they used What-If for simple cases and HAZOP for more complex cases.

Risk Screening or Ranking MOC

The MOC questionnaire contained a series of questions that are based upon the concept that proposed MOC's should be screened to provide the appropriate resources in order to evaluate the impact on safety from the proposed change. About 44% of the respondents stated that they were using risk screening of MOC's. Local in-house staff developed most of the screening procedures with some input from corporate PSM groups. There was no consistency regarding who would conduct the risk screening procedure. There were responses that indicated both the MOC initiator and the MOC coordinator as individuals responsible for MOC screening.

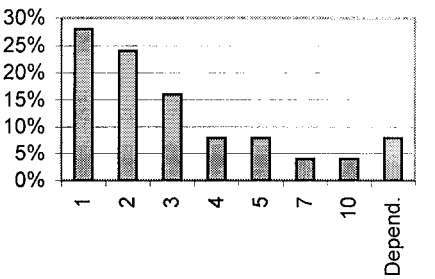
Risk screening procedure should determine categories of risk in order to classify the screening results. The number of categories varied between 3 to 7, however, in one case 20 categories was also reported.

Five (19%) facilities reported that potential consequences and potential events were evaluated separately in the determination of risk categories. Checklists were noted to be the preferred evaluation methods over experienced staff evaluation.

Authorization

As indicated in Figure 6, the number of authorizations for MOC approval varied widely with 76% of the respondents requiring four or fewer authorizations. However, some respondents indicated higher number of authorizations with one indicating a maximum of 10 authorizations. A few of the respondents indicated that those are the maximum but the actual number of authorizations is determined on a case-by-case basis according to the risk level. Most of the facilities use the same number of authorizations for levels of risk screening as well as for all MOC risk categories.

Figure 6: Distribution of Number of Autorizations Required for MOC Approval



As revealed from the survey, at most facilities Pre-Startup Safety Review (PSSR) is identified as the closure of MOC procedure. PSSR is conducted by both operations and MOC coordinators; but mainly by operations. Some 63% of the participants reported that PSSR following the turnarounds were handled separately from other PSSR's.

Applying MOC to Organizational changes

Only 44% of the respondents reported applying MOC programs to organizational changes. Some of the respondents indicated that some of the audits recommended the inclusion of organizational changes in the MOC programs.

Summary and Conclusions

In general, MOC programs are implemented plant-wide. Only half of the respondents in this survey apply MOC procedures to organizational changes. MOC policies and procedures are developed almost entirely by the local plant personnel without external assistance except in a few cases. There is a high degree of consistency with regard to restoring changes related to temporary MOC's to their previous conditions, although audit results pointed to some level of ambiguity of temporary MOC issues. Majority of the respondents reported difficulties in recalling elementary emergency MOC data. Lack of training was most noted in audit recommendations and may raise the question of the need to develop guidelines for training for MOC programs. Half of the respondents indicated that they do not use risk-screening procedures.

The well-known phrase "You can't manage what you don't measure" illustrates the need to measure the effectiveness of Management of Change programs. Unfortunately, only

about a third of the participants measure MOC effectiveness. An interesting piece of information was the opinion of the respondents regarding the level of implementation of the MOC program at their sites. Of the 50% that responded to this question, 38% indicated that the program needed improvement while the remaining 12% were satisfied with their program.

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