GUIDANCE FOR IMPLEMENTING PROGRAMS FOR OSHA 29 CFR 1910.119

PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS

PART SIX

MANAGEMENT OF CHANGE

by

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GUIDANCE FOR IMPLEMENTING PROGRAMS FOR OSHA PSM

MANAGEMENT OF CHANGE

This document contains information that may assist a company in establishing, or reviewing and updating, the management of change (MOC) element of their process safety management (PSM) program. The information in this document is based upon the U.S. Occupational Safety and Health Administration's regulation, 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*. However, this information may be of use to anyone developing or updating a PSM program for any purpose.

In 1993 the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) commissioned Primatech Inc. to develop a "training material reference manual" related to 1910.119. The purpose of the manual is to provide OSHA's Office of Training and Education with a resource for training federal and state OSHA field officers on enforcing the PSM regulation.

The training material reference manual features an annotated form of the Program-Quality-Verification (PQV) inspection checklist originally presented in Appendix A of OSHA Instruction CPL 2-2.45A. Example programs are provided to illustrate the positive and negative indicators of the checklist questions. OSHA has agreed to allow Primatech to make this information available to interested parties. This should in no way be construed as acceptance by OSHA of the suitability of the information or examples provided herein.

The format of this document follows the PQV inspection checklist presented in Appendix A of OSHA Instruction CPL 2-2.45A, often referred to as the "compliance directive". For each question in the PQV inspection checklist, clarification is provided on the checklist item along with positive program indicators and negative program indicators for each question. The positive and negative program indicators are intended to provide ideas for the user to help them in assessing their existing or planned program.

The example programs provided in this document illustrate approaches taken by companies seeking to address the requirements of 1910.119. These examples have not been reviewed and/or endorsed by OSHA and should not be construed as model programs.

The example programs provided herein were developed for specific processes, and are not generic in nature. Since the OSHA PSM regulation is performance-based, readers are strongly encouraged to develop programs tailored to their own covered processes.

This document is offered for the user's general guidance only. This document does not attempt to provide any interpretation of the OSHA regulations.

Primatech makes no claims regarding the acceptability to OSHA of the information contained herein to OSHA. Consequently, Primatech can accept no liability for any use which the user may make of the information contained herein. Note that the information contained in this manual does not necessarily represent the opinion of Primatech.

OVERVIEW

This guidance document is arranged in a tabular format. The following is a description of each of the column headings used in the table:

PQV Question

The PQV question is derived from the checklist in Appendix A of the OSHA Compliance Directive (CPL 2-2.45A), which is based on the specific regulatory requirements for the element. Note that the verification portion of the checklist includes questions for records review, on-site conditions, and interviews. In order to avoid unnecessary duplication of information, this guidance document references the checklist questions from the records review section only. Specific questions or concerns from the on-site conditions and interviews sections that are not addressed in the records review section are accounted for in the positive and/or negative program indicators column.

Explanation

The explanation clarifies or provides additional insight into the PQV question. In some cases, the explanation provides an interpretation of the PSM requirement. In no cases should the information contained in this column be viewed as a substitute for the actual regulatory requirement.

Positive Program Indicators

The information included in the positive program indicators column is intended to provide guidance and examples on what to look for in a well developed program. This column also includes guidance on what to look for when evaluating PSM programs. This column is not intended to contain all conceivable attributes of a good program for all industry types. Rather, it is intended to provide suggestions and ideas on what a good program might include.

Negative Program Indicators

The information in the negative program indicators column is intended to provide guidance on possible signs of a poor or incomplete program. This information could be of assistance for identifying potential problem areas when conducting PSM program evaluations. A PSM program that contains one or more of these attributes does not necessarily constitute a poor program. Rather, this information is intended to serve as a guide on what to look for in a less developed program.

It is important for the user of this manual to understand that over 25,000 employers may be covered under the PSM standard. Covered facilities range from large complex chemical, petrochemical, or petroleum facilities, to relatively simple ammonia refrigeration or chlorination systems. This guidance document cannot cover all of the possible ranges regarding the content of PSM program elements in the various industry groups. Additionally, since the PSM standard is a performance based regulation, this guidance document can not address the specific approaches different companies or facilities may choose to implement in complying with the requirements.

In addition to the table, this guidance document contains several helpful appendices, including:

Appendix A - List of Acronyms	Contains description of key acronyms used in the guidance document.
Appendix B - Glossary of Terms	Contains definitions of key terms used in the guidance document.
Appendix C - Technical References	Contains a list of helpful technical references to support the information presented in the table.
Appendix D - Example Program(s)	Contains example(s) of how this PSM element has been adopted. Most of the examples are actual programs provided by industrial companies.

PSM TRAINING MATERIAL REFERENCE MANUAL

MANAGEMENT OF CHANGE [29 CFR 1910.119 (l)]

PQV Question	Explanation	Positive Program Indicators	Negative Program Indicators
1. Are there written procedures for managing changes [except for "replacements in kind"] to process chemicals, technology, equipment, and procedures and changes to facilities that affect a covered process?	Policies and procedures should exist for personnel to follow when a change (except for a "replacement in kind") is being considered. The purpose of the management of change system is to provide a control mechanism so that changes are made with due consideration to safety. Changes in process technology can result from changes in production rates, raw materials, equipment unavailability, new equipment, new product development, change in catalyst or changes in operating conditions to improve yield or quality. Equipment changes include, for example, changes in materials of construction, equipment specifications, piping arrangements, computer control system revisions and changes in alarms and interlocks. Procedural changes include, for example, changes to emergency response, maintenance, contractor, training and operating procedures.	There is a formalized management system in place with written procedures to manage changes (except for "replacements in kind"). Procedures address steps for assessing impacts on safety and health, approving changes and employee responsibilities. Requirements for reviewing designs for temporary and permanent changes, and steps needed to verify that modifications have been made as designed, are part of the written procedures. Procedures include variance procedures, time limit authorizations for temporary changes, and steps required to return the process to status quo after temporary changes have been completed. Records are available to show that management of change procedures are followed for new or revised processes. Plant and department managers, technical staff and supervisors are familiar with the management of change procedures and the detailed step-by-step procedures through which a change is implemented. If necessary, procedures are written to determine when a change is major or minor.	Procedures for managing changes do not exist or are incomplete. Procedures do not address changes to process chemicals, technology, equipment or facilities when affected by a change. Records to support the written procedures do not exist. Records to support the procedures do not include all of the steps for management of change as outlined in the procedures. Management of change procedures are not used to ensure that the equipment and procedures are returned to their original or desired conditions at the end of the temporary change. Interviews with employees indicate that procedures to manage change are not implemented or being enforced.

PSM TRAINING MATERIAL REFERENCE MANUAL

MANAGEMENT OF CHANGE [29 CFR 1910.119 (l)]

POV Question	Explanation	Positive Program Indicators	Negative Program Indicators
1. Are there written procedures for managing *changes [except for* "replacements in kind"] to process chemicals, technology, equipment, and procedures and changes to facilities that affect a covered process?	Policies and procedures should exist for personnel to follow when a change (except for a "replacement in kind") is being considered. The purpose of the management of change system is to provide a *control mechanism* so that changes are made with due consideration to safety. Changes in process technology can result from changes in production rates, raw materials, equipment unavailability, new equipment, new product development, change in catalyst or changes in operating conditions to improve yield or quality. Equipment changes include, for example, changes in materials of construction, equipment specifications, piping arrangements, computer control system revisions and changes in alarms and interlocks. Procedural changes include, for example, changes to emergency response, *maintenance, contractor,* training and operating procedures.	There is a formalized management system in place with written procedures to manage changes (except for "replacements in kind"). Procedures address steps for assessing impacts on safety and health, approving changes and employee *responsibilities.* *Requirements for reviewing designs* for temporary and permanent changes, and steps needed to verify that modifications have been *made as designed, are part of* the written procedures. Procedures include variance procedures, time limit authorizations for temporary changes, and steps required to return the process to status quo after temporary changes have been completed. Records are available to show that management of change procedures are followed for new or revised processes. Plant and department managers, technical staff and *supervisors are familiar with the management* of change procedures and the detailed step-by-step procedures through which a change *is implemented.* If necessary, procedures are written to determine when a change is major or minor.	Procedures for managing changes do not exist or are incomplete. Procedures do not address changes to process chemicals, technology, equipment or facilities when affected by a change. Records to support the written procedures do not exist. *Records* to support the procedures do not include all of the steps for management of *change as outlined in the procedures.* *Management of change procedures are not* used to ensure that the equipment and procedures are returned to their *original* or desired conditions at the end of the temporary change. Interviews with employees indicate that procedures to manage change are not implemented or being enforced.

MANAGEMENT OF CHANGE [29 CFR 1910.119 (l)]

PQV Question	Explanation	Positive Program Indicators	Negative Program Indicators
2. Do the procedures assure that the technical basis for the proposed change is addressed prior to any change?	The purpose, scope and objective for process changes should be documented. The technical nature of changes are fully explained such that responsible parties can understand their full implications. The technical basis for the change should include a description of why the change is necessary.	Documentation exists to support that the technical basis for the change was addressed including design reports, calculations, explanation of why the change is being made, and the design codes and standards that the change will adhere to. Interviews with employees confirm that prior to any change, the technical basis of the change was addressed.	Documentation does not exist to show the technical basis for proposed changes. Interviews with employees indicate that procedures to address the technical basis for changes are not followed.
3. Do the procedures assure that the impact of the change on safety and health is addressed prior to any change?	Procedures should exist to require an assessment of the effects changes may have on safety and health.	*MOC procedures assess the impact a change* will have on safety and health. This can be accomplished through *a simple report which* overviews the possible safety and health effects, if any, due to the proposed change when the change or the effects are straightforward. Alternatively, a more formal review may be necessary if the possible effects are significant and a more thorough analysis and documentation are justified. For major process or equipment changes and/or minor changes which introduce a major impact on safety and health, facilities may consider conducting a PHA. Where the impact of the change is minor and well understood, a safety checklist may be used and reviewed by an authorized person. The safety and health implications of the change are reviewed with employees who may be affected by the change.	Documentation does not contain sufficient information regarding the effects the proposed changes will have on safety and health. For a minor change, a review of the changes on safety and health is not conducted prior to any change. For a major process or equipment change, no detailed hazard evaluation is completed.

PQV Question	Explanation	Positive Program Indicators	Negative Program Indicators
2. Do the procedures assure that the technical basis for the proposed change is *addressed prior* to *any* change?	The purpose, scope and objective for process changes *should be documented. The technical* nature of changes are fully explained such that *responsible* parties can understand their full implications. The technical basis for the change should include a description of why the change is necessary.	Documentation exists to support that the technical basis *for the change was* addressed including design reports, calculations, explanation of why the change is being made, and the design codes and standards that the change will adhere to. Interviews with employees confirm that prior to any change, the technical basis of the change was *addressed.*	Documentation does not exist to show the technical basis for proposed changes. Interviews with employees indicate that procedures to address the technical basis for changes are not followed.
3. Do the procedures assure that the impact of the change on safety and health is addressed prior to any change?	Procedures should exist to require an assessment of the effects changes may have on safety and health.	MOC procedures assess the impact a change will have on safety and health. This can be accomplished through *a simple report which overviews the possible safety and* health effects, if any, due to the proposed change when the change or the effects are straightforward. Alternatively, a more formal review may be necessary if the possible effects are significant and a more thorough analysis and documentation are justified. *For major process or equipment changes and/or minor* changes which introduce a major impact on safety and health, facilities may consider conducting a PHA. Where the impact of the change is minor and well understood, a safety checklist may be used and reviewed by an authorized person. The safety and health implications of the change are reviewed with employees who may be affected by the change.	Documentation does not *contain sufficient* information regarding the effects the *proposed* changes will have on safety and health. For a minor change, a review of the changes on safety and health is not conducted prior to any change. *For a major* process or equipment change, no detailed *hazard* evaluation is completed.

MANAGEMENT OF CHANGE [29 CFR 1910.119 (l)]

PQV Question	Explanation	Positive Program Indicators	Negative Program Indicators
4. Do the procedures assure that modifications to operating procedures are addressed prior to any changes?	Procedures should exist to require a review and update of operating procedures prior to implementing a change.	Documentation includes procedures to review and update operating procedures. *Necessary updates to operating procedures are in place* and reviewed with operations personnel prior to the change being implemented. Interviews with operators, maintenance employees, and engineers confirm updates to operating procedures are addressed prior to any change.	No determination is made concerning the effect that the proposed change will have on operating procedures. Operating procedures are not updated prior to implementing the change.
5. Do the procedures assure that the necessary time period for the change is addressed prior to any change?	The time period allowed for implementation of the change should be carefully considered to avoid abuse of "temporary" changes. Procedures exist to determine whether a change is considered temporary or permanent. The allowable time period for the change should be documented. Changes which exceed the time period require re-analysis *and approval.*	Procedures specify a maximum time frame allowed for a temporary change to be in effect. Procedures outline the number of times that a temporary change may be re-authorized. Procedures contain information on what constitutes a *temporary or permanent change.* Management of change procedures make a clear distinction between major and minor changes.	*Procedures do not include the maximum* time that a temporary change may be in effect, or the number of times a temporary change may be authorized. Interviews with employees and contractors indicate that the time period for changes is exceeded without approval.
6. Do the procedures assure that the authorization requirements for the proposed change are addressed prior to any change?	Written procedures should exist requiring authorized review and approval before any changes are made. The authorization procedures and responsible individuals should be clearly identified.	Management of change procedures have established levels of required review and approval for various types of changes. Proper authorization may be required from one or more of the following groups: operations, engineering, safety, maintenance, and/or environmental. Procedures indicate how verbal approvals are to be documented, where allowed by written MOC procedures. Interviews with employees and documentation review confirm that procedures are followed to obtain authorized approval prior to any change.	No procedures exist for authorizing proposed changes. Interviews conclude that changes are made without the required authorization(s). There are no procedures for documenting verbal authorizations.

MANAGEMENT OF CHANGE [29 CFR 1910.119 (l)]

PQV Question	Explanation	Positive Program Indicators	Negative Program Indicators
7. Are employees involved in operating a process, and maintenance and contract employees whose job tasks will be affected by change informed of, and trained in, the change prior to startup of process or affected part of process?	Employees affected by the change, or whose actions could create a potential hazard as a result of the change, should be adequately trained in the new procedures prior to startup.	Procedures exist to train employees whose job function involves implementing the change. Also, the procedures require that those employees who may be affected by the change are trained in the new process conditions and safety issues surrounding the change. The training is documented to have occurred prior to the change being implemented. Interviews with those involved confirm that training was given for the change prior to implementation. Operator training documentation supports that changes were addressed through specific employee training. Management of change documentation specifies all employees affected by the change. In addition, operator training documentation supports that these employees were trained regarding the change.	Procedures do not exist or do not require communication to employees and training of employees who will be involved or affected by the process change. Interviews with affected employees indicate that training is inadequate or non-existent. No documentation of training of affected employees exists.
8. Is the process safety information required by paragraph [d] updated if changed?	If a change results in revisions to the process safety information, such information should be updated.	Written procedures exist that require that process safety information is changed accordingly (including information pertaining to the hazards of the highly hazardous chemicals in the process, the technology of the process, and/or the equipment in the process). The management of change procedure requires documentation of the process safety information which should be updated as a result of the change.	No procedure exists that requires that PSI be updated when affected by a change. Documentation does not support that process safety information is updated when affected by a change.
9. Are the operating procedures or practices required by paragraph [f] updated if changed?	If a change results in revisions to the operating procedures, such procedures should be updated.	Procedures exist that require that changes to the initial startup, normal operations, emergency operations, shutdown and temporary operations procedures are updated as required. Interviews as well as documentation reviews confirm that procedures are updated as changes are implemented.	Current operating procedures do not reflect changes or modifications that have been made. Interviews and documentation reviews confirm that operating procedures are not updated as changes are implemented.

APPENDIX A

List of Acronyms

LIST OF ACRONYMS

AIChE *	American Institute of Chemical Engineers
ANSI *	American National Standards Institute
API *	American Petroleum Institute
ASHRAE *	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ASME *	American Society of Mechanical Engineers
ASTM	American Society for Testing and Material
AWS *	American Welding Society
BFD	Block Flow Diagram
CCPS *	Center for Chemical Process Safety
CGA *	Compressed Gas Association
CMA *	Chemical Manufacturers Association
DIERS	Design Institute for Emergency Relief Systems
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FMEA	Failure Mode and Effects Analysis
FTA	Fault Tree Analysis
HAZOP	Hazard and Operability Study
HHC	Highly Hazardous Chemical
IDLH	Immediately Dangerous to Life and Health
IIAR *	International Institute of Ammonia Refrigeration
ISA	Instrument Society of America

LC	Lethal Concentration
LD	Lethal Dose
MSDS	Material Safety Data Sheet
NFPA *	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
P&ID	Piping and Instrument Diagram
PEL	Permissible Exposure Limit
PFD	Process Flow Diagram
PHA	Process Hazard Analysis
PSM	Process Safety Management
PQV	Program-Quality-Verification
SOCMA	Synthetic Organic Chemical Manufacturers Association
SOP	Standard Operating Procedure
STEL	Short Term Exposure Limit

* Mailing address and telephone numbers included

Referenced Agency Addresses and Phone Numbers

AIChE
American Institute of Chemical Engineers
345 East 47th Street
New York, New York 10017
Phone: 212-705-7338

ANSI
American National Standards Institute
11 West 42nd Street
New York, New York 10036
Phone: 212-642-4900

ASHRAE
American Society of Heating, Refrigerating and Air-Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, Georgia 30329
Phone: 404-636-8400

ASME
American Society of Mechanical Engineers
22 Law Drive
P. O. Box 2300
Fairfield, New Jersey 07007-2300
Phone: 800-843-2763

AWS
American Welding Society
550 N.W. LeJeune Road
Miami, Florida 33126
Phone: 800-443-9353

CCPS
Center for Chemical Process Safety of the AIChE
345 East 47th Street
New York, New York 10017
Phone: 212-705-7319

Referenced Agency Addresses and Phone Numbers (Continued)

CGA
Compressed Gas Association
1725 Jefferson Davis Highway, Suite 1004
Arlington, Virginia 22202
Phone: 703-412-0900

CMA
Chemical Manufacturers Association
2501 M Street, N.W.
Washington, D.C 20037
Phone: 202-887-1100

IIAR
International Institute of Ammonia Refrigeration
1101 Connecticut Avenue, N.W., Suite 700
Washington, D.C. 20036
Phone: 202-857-1110

ISA
Instrument Society of America
67 Alexander Drive
P.O. Box 12277
Research Triangle Park, North Carolina 27709
Phone: 919-549-8411

NFPA
National Fire Protection Association
1 Batterymarch Park
Quincy, Massachusetts 02169
Phone: 800-344-3555

APPENDIX B

Glossary of Terms

GLOSSARY OF TERMS

BLOCK FLOW DIAGRAM or BFD[1]

A diagram used to show the major process equipment and interconnecting process flow lines as well as flow rates, stream composition, temperatures, and pressures. The BFD is intended as a simplified diagram.

CHECKLIST[2]

Detailed list of desired system attributes or steps for a system or operator to perform. Usually written from experience and used to assess the acceptability or status of the system or operation compared to established norms.

CONSEQUENCE[2]

The direct, undesirable result of an accident sequence usually involving a fire, explosion, or release of toxic material. Consequence descriptions may be qualitative or quantitative estimates of the effects of an accident in terms of factors such as health impacts, economic loss, and environmental damage.

DECISION TREES[4]

Decision trees are a special case of event tree models used to guide the user through multiple questions and provide a course of action based on the outcome of all of the questions. They provide no logical method of choosing the initiating event.

ELECTRICAL ONE-LINE DIAGRAM[1]

A diagram including legend of the electrical power distribution system that could contribute to a highly hazardous chemical release showing such items as power consumers, the chain of supply back through starters, distribution centers, substations to the main feeder, emergency power supply, and connections to various components. For complex systems, the one-line diagram may be a group of drawings.

FACILITY[3]

The buildings, containers and equipment that could reasonably participate in a catastrophic release as a result of being physically interconnected or of their proximity and in which dangerous substances are used, stored, manufactured, handled, or moved.

FAILURE MODE AND EFFECTS ANALYSIS or FMEA[1]

A specifically designed method to identify the conceivable ways that a highly hazardous chemical equipment or its components can fail and the effect of the failure on the system with respect to a release. The failure and effects are determined in a study of updated piping and instrument diagrams that describe the facility taking into consideration process chemistry, standard operating procedures, maintenance procedures, operator job descriptions, process flow diagrams, inventory tabulations, electrical one-line diagrams and other documents. The resulting qualitative analysis is translated into a quantitative FMEA when probabilities of the failure of components are assigned. The results of the FMEA are reported for a unit or system of a facility on an FMEA table. The results are entered on a FMEA table for each equipment item or component studied are as follows: the identification number of the item, the name of the item, the other equipment potentially affected with the equipment identification number and the effect of the failure on that equipment, a classification of the criticality ranking of the failure based on quantity or rate of the potential release, the probability of the failure and the suggested action in terms of equipment or procedure to prevent the failure or to mitigate the results of the failure.

FAULT TREE ANALYSIS or FTA[1]

The analysis of the logic diagram constructed from a study of the updated piping and instrument diagrams that describe the facility taking into consideration process chemistry, standard operating procedures, maintenance procedures, operator job descriptions, process flow diagrams, inventory tabulations, electrical one-line diagrams and other documents. The logic diagram is called a fault tree and represents a qualitative analysis of the hazards. Results of the FTA are reported for a unit or system on a table. Entered on the table are the descriptions of the various combinations of equipment or procedural failures that can lead to a release. The combinations are determined by solving the fault tree logic diagram for the minimal cut sets, that is, the smallest combination of equipment or procedural failures, which if all occur, will result in the "top event", that is the highly hazardous chemical release. The table is also entered with a criticality ranking based on the quantity or rate of the potential release, a probability for the respective failures and the suggested action in terms of equipment or procedure to prevent the failure or to mitigate the results of the failure. The analysis of the logic diagram includes the identification of "minimal cut sets." When probabilities are assigned to each element of the event sequence, a qualitative fault tree is obtained which gives the probability or frequency of occurrence of the release.

HAZARD[2]

An inherent physical or chemical characteristic that has the potential for causing harm to people, property, or the environment.

HAZARD ANALYSIS[1]

A systematic identification of the potential conditions that may result in an EHS accident.

HAZARD AND OPERABILITY STUDY or HAZOP[1]

A systematic study of updating piping and instrument diagrams that describe the highly hazardous chemical facility taking into consideration process chemistry, standard operating procedures, maintenance procedures, operator job descriptions, process flow diagrams, chemical inventory tabulations, electrical one-line diagrams and other documents. The study is performed by a multidisciplinary team to identify hazard or operability problems that would result in a highly hazardous chemical accident. Deviations from the design value of key parameters (flow, temperature, composition, time, quantity, etc.) of each segment of the highly hazardous chemical facility and its procedures are studied using guide words (such as, more of, less of, none of, part of, more than and other) to control the examination and evaluation. The study team shall consist of trained personnel knowledgeable in the technology and operations, such as process chemistry, the design of the system, the procedures of its operation and maintenance, and the related codes, standards and practices. In addition, the study team shall have technical expertise to answer most questions of the review without resorting to further expertise. The study team shall include a study leader specifically qualified for his or her leadership role by training or previous experience in HAZOP studies and a team secretary who shall record the results of the study. Persons who occupy these team study positions shall be technically trained and be available for the duration of the study. Results of the HAZOP study shall be reported by tabulation for a unit by key equipment, such as vessels or pipelines, and process parameter. The results are entered on the table as follows: guide word, causes of the deviation, consequences of the deviation in terms of a potential release, the criticality based on the quantity or rate of potential release and the suggested action in terms of equipment or procedure to mitigate the deviation.

HIGHLY HAZARDOUS CHEMICAL or HHC[3]

A substance possessing toxic, reactive, flammable, or explosive properties.

HUMAN ERROR[2]

Actions by or failures to act on the part of designers, operators, managers, or other individuals that may contribute to or result in accidents.

MATERIAL SAFETY DATA SHEET or MSDS[1]

A document which describes, at a minimum, the chemical and physical properties and the physical and health hazards of a substance.

MODIFICATION[1]

Any change in existing equipment or procedures that would require a change in process safety information and/or operating procedures. Modification does not include routine maintenance or replacement in kind.

OPERATOR[2]

An individual responsible for monitoring, controlling, and performing other tasks as necessary to accomplish the productive activities of a system. Often used in a generic sense to include people who perform various tasks (e.g.; reading, calibration, maintenance).

PIPING AND INSTRUMENT DIAGRAM or P&ID[1]

One or more detailed drawings including legends and citations of referenced documents showing: every item of highly hazardous chemical equipment and its identification number (including installed spare equipment); every pipe size, flow direction, identification number and identification of ANSI piping specification and break between piping specifications; symbols and identification of every instrument including instrument function to show trips and interlocks represented in accordance with Instrument Society of America standards or a standard adequate for the conduct of a safety review or hazard analysis with an appropriate symbol legend shown, every valve, the failsafe position of control valves or non-hand operated valves in the case of instrument air or power failure; steam traps; representation of insulation or heat tracing of piping, highly hazardous chemical equipment and instruments; sizes of all important equipment nozzles with location shown schematically to reflect function and elevation, such as, drains, vents, flushing connections and steam connections; references to inter-facing with other diagrams describing process, service, treatment, disposal, or utility systems; data on type, size, and set pressures of every relief valve and relieving device; instruments to monitor early detection of abnormal conditions or a highly hazardous chemical release; where critical, the relative elevations between equipment and of key piping; notes or symbols on such items as slope of critical piping to avoid pockets, or, where critical symmetrical piping; notes on each item of highly hazardous chemical equipment, such as, material of construction, design temperature, design pressure, design thermal duty of heat exchangers, design capacity and dynamic head of rotating equipment, etc.

PRELIMINARY HAZARD ANALYSIS[2]

A technique that is derived from the U.S. Military Standard System Safety Program Requirements. Focuses in a general way on the hazardous materials and major process areas of a plant, and is often used as a precursor to further hazard analyses.

PROCESS CHEMISTRY[1]

The chemical reactions which are relevant to possible scenarios of highly hazardous chemical releases, including information on raw materials, intermediates, products, and waste products.

PROCESS FLOW DIAGRAM *or* PFD[1]

A diagram including a legend of a facility which depicts the use, generation, storage or handling of a highly hazardous chemical showing items of equipment (groups of duplicate equipment may be represented by one symbol if desired), flow of material from item to item, simplified basic control loops or major control schemes, points of discharge to the environment, and showing or cross-referencing documents which give details of material balance, flows, raw materials, products, intermediates, treatment chemicals, operating conditions of temperature, pressure and steam characteristics, operating cycles and batch sizes where applicable. A process flow diagram includes, or references, a block flow diagram that depicts the receipt, handling and storage steps at the site of shipping containers of the highly hazardous chemical.

PROCESS SAFETY MANAGEMENT[2]

The application of management systems to the identification, understanding, and control of process hazards to prevent process-related incidents and injuries.

REPLACEMENT IN KIND[1]

The replacement of existing highly hazardous chemical equipment with identical or equivalent highly hazardous chemical equipment, and installation according to criteria for design and operation.

RISK[2]

Combination of the expected frequency (events/year) and the consequence (effects/event) of a single accident or a group of accidents.

STANDARD OPERATING PROCEDURE[1]

The document setting forth the operating procedures covering all details of the operation involving highly hazardous materials that are currently in effect at the facility.

TRUTH TABLES[4]

A listing of all combinations of the states of basic events, the resulting occurrence or non-occurrence of a top event, and the corresponding probabilities for the combinations.

WHAT-IF CHECKLIST[1]

A method of hazard analysis based on a systematic study of updated piping and instrument diagrams that describe the highly hazardous chemical facility taking into consideration process chemistry, standard operating procedures, maintenance procedures, operator job descriptions, process flow diagrams, inventory tabulations, electrical one-line diagrams and other documents. The study is performed by a multidisciplinary team to identify hazards or operability problems that could result in a highly hazardous chemical accident. The study is composed of a comprehensive list of questions prepared in advance from study of documents by team members either in conference or independently usually corresponding to their individual background. The study team shall consist of trained personnel knowledgeable in the technology and operations, such as process chemistry, the design of the equipment, the procedures of operation and maintenance and the related criteria for design and operation. In addition they shall have technical expertise to answer most of the questions of the review without recourse to further expertise. The team shall include a person assigned to lead the study and a person to record the results who are technically trained and will be available for the duration of the study. Results of the study shall be reported for a unit on a table. The results are entered on the table as follows: the "what if" question and its corresponding consequence/hazard, the criticality based on the quantity or rate of the potential release and the recommended action in terms of equipment or procedure to mitigate the consequence/hazard.

1. New Jersey Toxic Catastrophe Prevention Act, N.J.A.C. 7:31, New Jersey Department of Environmental Protection and Energy, June 18, 1993.

2. Guidelines for Hazard Evaluation Procedures, 2nd. ed., Center for Chemical Process Safety of the American Institute of Chemical Engineers, 1992.

3. Process Safety Management of Highly Hazardous Chemicals, 29 CFR Part 1910.119, Occupational Safety and Health Administration, February 24, 1992.

4. Reliability Engineering and Risk Assessment, Ernest J. Henley and Hiromitsu Kumamoto, Princeton-Hall, Inc., 1981.

TECHNICAL REFERENCES

MANAGEMENT OF CHANGE

Guidelines for Hazards Evaluation Procedures, 2nd ed., Center for Chemical Process Safety of the American Institute of Chemical Engineers, 1992.

Plant Guidelines for Technical Management of Chemical Process Safety, Center for Chemical Process Safety of the American Institute of Chemical Engineers, 1992.

Management of Change in Chemical Plants, Roy E. Sanders, Butterworth-Heinemann Ltd., Oxford, England, 1993.

WAC 296-67-045 Management of Change

GENERAL REFERENCES

Ammonia Plant Safety (and related facilities), vol. 23, American Institute of Chemical Engineers, 1981.

Ammonia Plant Safety (and related facilities), vol. 24, American Institute of Chemical Engineers, 1984.

Ammonia Plant Safety (and related facilities), vol. 27, American Institute of Chemical Engineers, 1987.

Ammonia Plant Safety (and related facilities), vol. 28, American Institute of Chemical Engineers, 1988.

Ammonia Plant Safety (and related facilities), vol. 31, American Institute of Chemical Engineers, 1988.

"Guidelines for Safe Automation of Chemical Processes," American Institute of Chemical Engineers, 220p.

"Guidelines for Investigating Chemical Process Incidents," American Institute of Chemical Engineers, 347p.

"Guidelines for Auditing Process Safety Management Systems," American Institute of Chemical Engineers, 136p.

"Management of Process Hazards," American Petroleum Institute. Recommended Practice 750.

"Process Safety Management (Control of Acute Hazards)," CMA.

Chemical Manufacturers Association (CMA's Manager Guide), First Edition, September 1991.

"The Revised Field Operations Manual (FOM)," OSHA Instruction CPL 2.54B, June 15, 1989.

"State Plan Policies and Procedures Manual," OSHA Instructions STP 2.22A, Ch-2, January 29, 1990.

"Integrated Management Information Systems (IMIS) Forms Manual, Chapter V " OSHA Instruction ADM 1-1.12B, December 29, 1989.

"Systems Safety Evaluation of Operations with Catastrophic Potential," OSHA Instruction CPL 2-2.45, September 6, 1988.

"Process Safety Management Guidelines for Compliance," OSHA 3133; U.S. DOL, 1992.

"Process Safety Management," OSHA 3132; U.S. DOL, 1992.

"Safety and Health Program Management Guidelines," U.S. DOL, 1989.

"Review of Emergency Systems," June 1988; U.S. EPA, Office of Solid Waste and Emergency Response, Washington DC 20480.

"Chemical Exposure Index," Dow Chemical Co., May 1988.

"Accident Investigation * * * A New Approach," National Safety Council, 1983.

Process Safety Management Resources from the American Institute of Chemical Engineers for Use by Industrial Hygienists, James A. Gideon and Thomas W. Carmody, American Industrial Hygiene Association Journal (53), June 1992.

"Improving Construction Safety Performance," Report A-3, The Business Roundtable.

"Recommended Guidelines for Contractor Safety and Health," Texas Chemical Council.

"Loss Prevention in the Process Industries," Volumes I and II, Frank P. Lees, Butterworth, 1983.

"Guidelines for Engineering Design for Process Safety," 500p.

IX D

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n by companies seeking to address the
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d should not be construed as model
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veloped for specific processes, and are
gulation is performance-based, readers
ailored to their own covered processes.

D-1 Management of Change Procedures - Ammonia Refrigeration System

The following is an example of a management of change procedure for an ammonia refrigeration facility. It includes procedures to be followed and authorizations needed when initiating a change.

MANAGEMENT OF CHANGE PROCEDURES

Ammonia Refrigeration System

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POLICY ON MANAGEMENT OF PROCESS CHANGE

Smith's Ice Cream Company (Smith's) is committed to the safe operation of our facilities to protect our workers, the public and the environment. This is accomplished to a great extent by a well developed and implemented Process Safety Management (PSM) Program. An essential element in the PSM Program is to ensure that changes to the process do not introduce an unrecognized or unacceptable hazard, or compromise the safeguards built into the process.

It is Smith's policy that no modification may be made to the ammonia refrigeration equipment or procedures without proper review and authorization. The management of change procedures are designed to ensure that any modifications are properly reviewed and that any hazards introduced by the modifications are identified and controlled. It is also intended that the procedures be flexible and not hamper the ability of personnel to optimize the operation of a process. The Site Maintenance Supervisor and the OSHA/EPA Compliance Coordinator are responsible for ensuring that the management of change procedures are implemented for the ammonia refrigeration facility.

The management of change procedure includes the following elements:

- Provisions to review and categorize the proposed change as either a minor change, major change, or replacement in kind;
- Provisions to conduct a safety and health review for all changes and conduct a process hazards analysis (PHA) for major changes;
- Provisions to ensure that changes are properly documented and communicated to the appropriate personnel.

Smith's shall evaluate the effectiveness of the management of change procedure, and update it as necessary, as part of the PSM audit. Process Safety Management audits are to be conducted on a frequency of at least once every three years.

1.0 INTRODUCTION

Any facility or process is continually undergoing change. Changes may be implemented to improve the efficiency of the operation, improve the operability, improve safety or to replace mechanical equipment. Any change, regardless of how small or insignificant it may seem, has the potential to compromise existing safeguards and have potentially catastrophic results.

It is recognized that change is essential during the life cycle of a facility or process. To allow for such changes, but to ensure that unrecognized and/or unacceptable hazards are not introduced, this procedure has been developed to help manage the necessary changes. The objective of this procedure is to ensure that all changes are properly reviewed and that any hazards introduced by the implementation of the change are identified and controlled prior to placing the change in operation.

2.0 SCOPE

2.1 Equipment and Procedures

This management of change procedure is intended to apply to all equipment and procedures involving the ammonia refrigeration system.

The equipment which is included within the scope of this procedure includes:

- Ammonia delivery system;
- Ammonia vessels (high pressure receivers, surge drums, pump receivers, intercoolers);
- Ammonia compression system (compressors and condensers);
- Ammonia distribution system; and,
- Ammonia heat transfer system (air units and glycol heat exchangers).

This procedure applies to any change in procedures as defined in Section 3.0, regardless of whether the change is considered major or minor, or is of a temporary or permanent nature.

2.2 Permanent and Temporary Change

All changes, whether considered temporary or permanent, shall be subject to review in accordance with this procedure. There shall be no differentiation between issues considered during review of a "permanent" change or a "temporary" change. Adequate safeguards, either procedural or consisting of installed hardware, shall be provided to safely operate a temporary change. Since it is likely that more emphasis will be provided on procedural safeguards for temporary changes, closer scrutiny may be warranted for temporary changes to ensure the modification does not represent an unacceptable risk.

In addition to all provisions contained herein for permanent changes, the following items shall be considered for temporary changes:

- the duration of the temporary change shall be specified on the MCF;
- all installed temporary changes shall be logged, with the expiration date of the change noted; and,
- prior to the expiration date of the change, the Site Maintenance Supervisor shall confirm that the change is to be removed by the expiration date. If necessary, an extension may be requested. The extension request shall be subject to approval in accordance with this procedure. No temporary change shall be granted more than five extensions, of a week long duration, or be allowed to extend beyond six weeks, including any extensions.

A copy of the original process documentation shall be kept in the PSM file along with the annotated documentation used for the temporary change. Upon removal of the temporary change, the Site Maintenance Supervisor is responsible for ensuring that the process is restored to the original condition with consideration to any permanent changes which may have been approved in the interim.

3.0 DEFINITIONS

The following is an alphabetical listing of terms and abbreviations used throughout this procedure with which a user of this procedure should be familiar. Where applicable, examples are given in order to provide clarification. These examples are intended to show typical issues which may arise and whether or not they constitute a change. This is not intended to be an all encompassing list of changes within the scope of this procedure. Rather, it is intended to provide guidance to help determine whether specific issues should be considered a change.

If in doubt whether a specific issue constitutes a change, it is recommended that it be considered a change and subject to the provisions of this procedure.

Catastrophic release:

A major release of ammonia resulting from uncontrolled developments which leads to, or could have led to, serious danger to persons both within and outside the workplace.

Change:

Any modification which affects the capability of a process to maintain control of the physical and chemical transformations taking place; including all modifications to equipment, procedures, computer software, raw materials and processing conditions other than "replacement in kind".

Change in computer software:

Temporary or permanent modification of computer software used to monitor and control the ammonia refrigeration system.

Examples:

- Change in alarm setpoints;
- Addition of alternate view screens;
- Change in control system logic.

Change in equipment:

Temporary or permanent modifications made to operating equipment.

Examples:

- Substitution of a material of construction with a different material. For example, a process vessel and/or section of piping is designed with killed carbon steel. Replacement of a section of the equipment with ordinary carbon steel would constitute a change;
- Replacement of a vessel with one of a different pressure rating;
- Piping changes;
- Replacing an existing field mounted, local pump control panel with a programmable logic controller;
- Changing the elevation of a vessel nozzle or the discharge location of a vessel outlet. For example, changing the location of a tank overflow from a location near the top of the tank to discharge at an elevation close to the ground;
- Installation of a bypass around a section of equipment;
- Installation of a parallel piece of equipment, such as a standby pump;
- Replacing a control valve with one of a different size;
- Replacing a gasket with one of a different material.

Change in facilities:

A change in facilities occurs whenever a change is made to plant services or utilities which would not necessarily appear on a process and instrument diagram.

Examples:

- Emergency back-up systems;
- Power supply system;
- Plant security;
- Fire detection and prevention system;
- Adjacent processes/equipment.

Change in procedures:

Temporary or permanent modification of written procedures.

Examples:

- Standard operating procedures;
- Preventive maintenance procedures;
- Inspection and testing procedures;
- Emergency operating procedures;
- Training procedures and requirements.

Change in process technology:

A change in process technology arises whenever the process or mechanical design is altered. A change in process technology may occur as a result of changes in the operating parameters (e.g., pressure, temperature), design inventories, instrumentation and control systems or materials of construction.

Examples:

- An increase in ammonia inventory;
- Equipment unavailability;
- Installation of new equipment, such as the installation of a new compressor;
- A change in operating pressure (or temperature, or flow rate, etc.) outside of established operating limits. For example, the established operating limits for a specific piece of equipment are 0-25 psig. It is desired to operate the equipment at 50 psig to obtain higher temperatures in the refrigeration system. Since the desired operating pressure (50 psig) is outside the established limits, this would constitute a change.

Critical equipment:

Refers to vessels, machinery, piping, alarms, interlocks and controls determined by *management* to be vital to preventing the occurrence of a catastrophic release.

Hazard:

A potential for an accident with undesirable consequences, usually involving a loss of containment of flammable, combustible, highly toxic (i.e., ammonia) or reactive materials.

Hazard analysis techniques:

Analytical techniques which aid in identifying and evaluating process hazards. Typical hazard analysis techniques which may be used include the "What-If" technique and the Hazard & Operability (HAZOP) technique. Other techniques which may be used for specific circumstances are discussed in the *Guidelines for Hazard Evaluation Procedures* published by the Center for Chemical Process Safety of the American Institute of Chemical Engineers. A hazard analysis is to be conducted on all changes classified as "major".

Major change:

A modification which has significant impact on process conditions or system parameters.

Examples:

- Installation of an additional compressor;
- Increase in ammonia inventory;
- Decommissioning major pieces of equipment;
- Installation of a significant amount of temporary piping;
- Installation of a distributed control system;
- Change in the control logic of computer software;
- A change in process variables, such as a significant increase or decrease in flow, temperature, or pressure.

Management of Change Form (MCF):

A format for requesting approval of a modification. A MCF form, along with any additional supporting documentation, is completed and approved by appropriate individuals at each step in the management of change procedure.

Minor change:

A modification which does not have a major impact on process conditions or system parameters.

Examples:

- Installation of standby equipment;
- Installation of process instrumentation;
- Different material of construction;
- Change in written Standard Operating Procedure;
- Addition or change of alarms and controls to the computer software;
- Installation of an addition control to a distributed control system.

Pre-startup safety review:

An inspection and technical review of a modification prior to implementation of the change to ensure that the modification has been installed in accordance with the approved design standards, that procedures are in place and adequate, and that training of operating personnel has been completed.

Process:

All activities that involve the receipt, storage, handling, compression, or movement of ammonia, including utility systems required for the safe operation of the ammonia facility.

Process hazard analysis:

The application of one or more hazard analysis techniques to aid in identifying and evaluating process hazards. A process hazard analysis is to be conducted for all changes classified as "major".

Replacement in kind:

Any process or equipment change performed in accordance with established design specifications. A "replacement in kind" does not require enactment of the Management of Change Procedure.

Examples:

- "Like for like" equipment replacement such as the replacement of a 400 Ton Evapco condenser with a 400 Ton Niagara condenser (assuming both condensers have the same piping connections, instrumentation, and controls);
- "Like for like" equipment replacement such as the replacement of a 400 Ton Evapco condenser with an identical 400 Ton Evapco condenser;
- Changes which do not require a change to the facility's Process Safety Information.

Safety review checklist:

A checklist which addresses the safety, health and environmental considerations of a proposed change. The safety review checklist is to be completed for all changes.

Temporary change:

A change with a limited and clearly specified duration. The time limit for a temporary change is not to exceed seven days. If necessary, a seven day extension may be requested. No more than five extensions may be requested. Any change with a duration of greater than six weeks should follow procedures for a permanent change.

Examples:

- Installing temporary piping, clamps, connections, utility connections or hoses;
- Temporary operation with specific safeguards bypassed or inoperative.
  - care must be taken any time there is a need to bypass a safeguard. If at all possible, safeguards should only be bypassed when the system is not in operation
  - under no circumstances should a pressure safety valve be blocked off during operation
  - under no circumstances should any hardwired interlocks (eg. high compressor discharge pressure shutdown) be bypassed during operation

4.0 OVERVIEW OF MANAGEMENT OF CHANGE PROCEDURES

This management of change procedure is intended to ensure that all changes to the ammonia facility are properly reviewed and that any hazards introduced by the implementation of the change are identified and controlled. However, it is also intended that the procedure be flexible and not hamper the ability of personnel to optimize the operation of the refrigeration system. The procedure provides guidelines for screening proposed changes in order to facilitate the authorization of changes which have no significant safety, health or environmental implications.

The procedure works as follows:

- A Management of Change Form (MCF) is initiated and submitted to the Site Maintenance Supervisor. The form includes;
  - the priority of the change;
  - the reason for the change;
  - a description of the technical basis for the change;

- The MCF is reviewed by the Site Maintenance Supervisor. The review involves;
  - an initial assessment of the technical basis for the change;
  - classification of the change as "replacement in kind", "minor", or "major";
  - identification of the change as temporary or permanent. If the change is temporary, indication of the duration for which the change is valid;
  - identification of drawings, procedures, and documentation which need to be modified;
  - assign a number for the MCF and log it;

- If the request does not fall within the definition of a change and thus is a replacement in kind, then review, approval and disposition of the request is outside the scope of this procedure;

- Preliminary engineering is done and reviewed by the Site Maintenance Supervisor, the Regional Engineer, or the OSHA/EPA Compliance Coordinator as necessary;

- A review of the impact of the change on safety and health is conducted by the Site Maintenance Supervisor or the OSHA/EPA Compliance Coordinator;

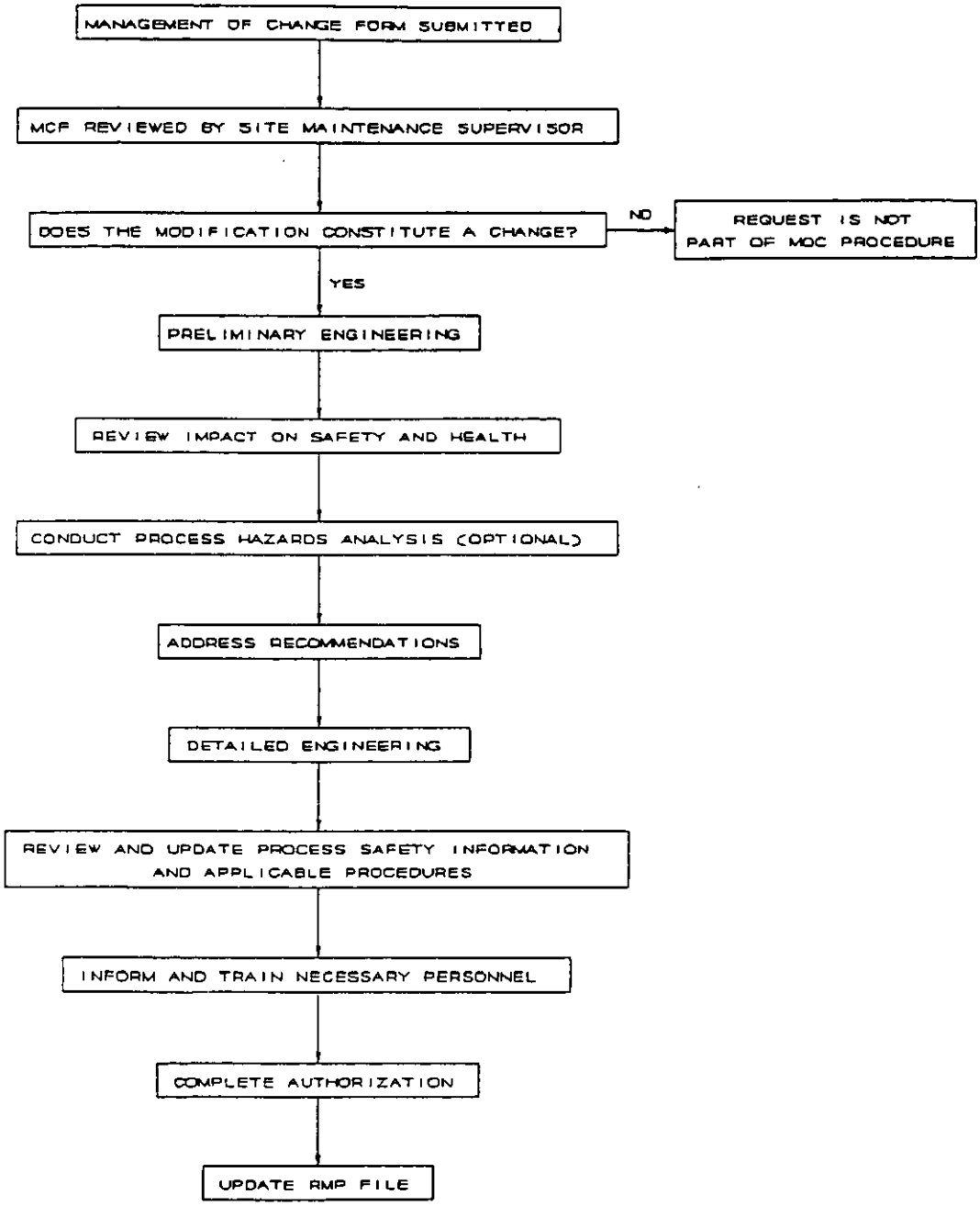
- If it is determined that the MCF constitutes a major change, as defined in this procedure, a formal process hazards analysis is conducted on the preliminary design;

- Detailed engineering, procurement and construction is completing. During this phase, recommendations identified during the safety and health review and during the process hazards analysis (if an analysis was performed) should be addressed;

- Pre-startup safety review is conducted to ensure that all drawings are annotated and updated to reflect any as-built changes, procedures are updated as necessary and training of personnel is conducted.

Figure 1 is a simplified flow diagram showing the overall procedure.

FIGURE 1 - MANAGEMENT OF CHANGE PROCEDURE



5.0 PERSONNEL RESPONSIBILITIES

The following describes the various persons/departments who may be involved in the management of change procedure, and summarizes their responsibilities.

A. Originator

- Complete Section 1 of the Management of Change Form (MCF) form in accordance with Appendix A;
- Submit MCF to Site Maintenance Supervisor for approval and processing; and,
- Work with other departments, as assigned, during the design and implementation of the modification.

B. Site Maintenance Supervisor

- Review initial MCF and classify the change as "minor", "major", or out of the scope of the management of change procedure;
- Log all MCFs received and assign number;
- Send copy of MCF, with assigned number, to OSHA/EPA Compliance Coordinator;
- Coordinate/conduct safety and health review using a safety review checklist;
- If the change is classified as "major":
  - designate a team to conduct a hazard analysis;
  - review hazard analysis report;
- Ensure any recommendations noted during the safety and health review and the hazard analysis (if analysis was conducted) are reviewed and those which are accepted be implemented prior to start-up;

- Approve MCF and preliminary design for final design and installation;
- Ensure the PSM files are updated; and,
- Ensure pre-startup safety review is conducted to ensure that the modification has been installed in accordance with the approved design standards, new procedures are developed prior to start-up of the modification or that existing procedures are modified accordingly, and that all personnel are trained on the new procedures; and,
- Supervise the initial start-up.

C. Regional Engineer

- Coordinate the preliminary engineering effort;
- Submit preliminary engineering package with MCF to the Site Maintenance Supervisor for process hazards review or safety review;
- Coordinate detailed design; and,
- Provide construction management, including procurement of necessary materials, hiring of contractors, and testing of equipment.

D. OSHA/EPA Compliance Coordinator

- Review the preliminary engineering effort;
- Assist in conducting the safety and health review;
- Assist in conducting the process hazards analysis; and,
- Approve MCF and preliminary design for final design and installation;

6.0 MANAGEMENT OF CHANGE PROCEDURES AND AUTHORIZATION

A number of steps are involved from the identification of the need for a change through to the final implementation of the change. A number of different persons and departments may also be involved. The following information describes the responsibilities at various levels in the organization for the major steps in the management of change procedure. The responsibilities are first described by the steps in the management of change procedure. The responsibilities are then summarized by department/individual.

6.1 Initiation of Management of Change Form

The first step in the management of change procedure is the identification of the need for a change and the initiation of a Management of Change Form (MCF). Section 1 of the MCF (see Appendix A) should be completed and signed by the individual originating the request. The MCF should be forwarded to the Site Maintenance Supervisor for review and approval. A request for change may be initiated from within either maintenance, operations, or management.

6.2 Screening of Management of Change Form

The Site Maintenance Supervisor receiving a MCF has the initial responsibility for reviewing the request. This initial screening of the MCF has two objectives.

The first is to assess the need for the requested modification. Suggestions for modifications to the refrigeration system are to be encouraged since many advantages may be gained. However, implementing a modification, or even the process of reviewing

and eventually dismissing a modification request, costs the company time and money. Therefore, an initial screening is necessary to weed out those modification requests which are unnecessary, inconsistent with company policy or may represent an unacceptable course of action.

The second is to identify which modifications are changes. The Site Maintenance Supervisor receiving a MCF should review it to determine whether the modification being requested falls within the definition of a change and if so, classify the change as "minor", "major", or "replacement in kind" (see Section 3.0 for definitions).

The Site Maintenance Supervisor must sign the MCF to indicate his/her approval of the MCF, assign a number to the MCF, and log it (see Appendix B). The log will be used in order to track the progress of a request for change as well as to maintain a historical record of changes made to the system. A copy of the MCF, with assigned number, will be sent to the OSHA/EPA Compliance Coordinator to indicate the MCF is being processed.

6.3 Replacement in Kind

If a modification request is determined to be a "replacement in kind", the Site Maintenance Supervisor may approve the request and return it to the originator for implementation without being subject to the provisions of this procedure.

6.4 Preliminary Engineering

The design and engineering of a change may be handled by the Site Maintenance Engineer, corporate engineering, or an outside contractor depending on the nature and scope of the change. Any design recommendations raised by the Site Maintenance

Supervisor, the Regional Engineer, or the OSHA/EPA Compliance Coordinator will be addressed during the preliminary engineering. When preliminary engineering is sufficiently complete, the design should be resubmitted to the Site Maintenance Supervisor for a safety and health review and, in the case of a "major" change, for a process hazard analysis.

6.5 Safety and Health Review

After the preliminary engineering has been completed, a safety and health review of the change is conducted by using the safety review checklist. The safety review shall ensure that:

- The modification has been installed in accordance with the approved design;
- That any field modifications are noted on the drawings;
- A qualitative evaluation of a range of the possible safety and health effects of failure of controls on employees in the workplace.

The Site Maintenance Supervisor or OSHA/EPA Compliance Coordinator will be responsible for ensuring the safety and health review is completed and documented with input from other departments and disciplines as needed.

6.6 Process Hazard Analysis

If the MCF constitutes a "major" change, it is necessary to conduct a process hazards analysis on the modification. The Site Maintenance Supervisor will designate a team to conduct a hazard analysis using an appropriate hazard identification technique. The hazard analysis is to be performed by a team of individuals. A typical analysis team

includes at least one individual knowledgeable in the analysis technique (usually the team leader or chairperson) as well as other individuals selected for their technical contribution to the study, with expertise in different areas such as engineering, operations, maintenance and safety. The Chairperson of the hazard analysis team will prepare a report describing any concerns which should be addressed during final engineering or implementation of the MCF. The Chairperson will then forward the hazard analysis report to the Site Maintenance Supervisor.

The process hazards analysis shall address:

- The hazards of the process;
- The identification of any previous incident which has a likely potential for catastrophic consequences in the workplace;
- Engineering and administrative controls applicable to the hazards and their interrelationships such as appropriate application of detection methodologies to provide early warning of releases;
- Consequences of failure of engineering and administrative controls;
- Facility siting;
- Human factors;
- A qualitative evaluation of a range of the possible safety and health effects of failure of controls on employees in the workplace.

6.7 Review of Recommendations

The Site Maintenance Supervisor or OSHA/EPA Compliance Coordinator will review all MCFs after preliminary engineering has been completed and a process hazard analysis and a safety and health review have been conducted. Any recommendations generated as a result of the preliminary engineering, process hazards analysis, or safety review must

be resolved prior to start-up. The resolution of all recommendations are to be documented. Documentation will include a description of the actions to be taken and a schedule for the implementation of recommendations. The reasons why any recommendations are not implemented will also be documented.

The Site Maintenance Supervisor and the OSHA/EPA Compliance Coordinator will sign the MCF indicating approval to proceed with final design, procurement, installation and start-up of the modification.

6.8 Conducting Pre-Startup Safety Review

A pre-startup safety review is to be conducted for the modifications to the ammonia refrigeration system prior to startup of the modified system. The review involves an inspection and technical review to ensure that the modification has been installed in accordance with the approved design standards, that procedures are in place and adequate, and that training of operating personnel has been completed. The specific procedures for conducting the review are documented in the "PRE-STARTUP SAFETY REVIEW PROCEDURES".

Management of change will require development of, or modification to, a number of documents. Any such documents which will be affected need to be identified early in the change process. Prior to start-up, these documents must be annotated or updated and all personnel informed and trained with regard to these changes.

Of particular importance is the change to any information included with the facility RMP file. The Site Maintenance Supervisor is responsible for ensuring that all documentation which is part of the PSM file is kept updated after a change has been made. For any temporary changes, the PSM files should include copies of any interim documents developed as part of the temporary change.

Key RMP documents that may need to be updated include:

- Process Safety Information
  - Information pertaining to the hazards of the highly hazardous chemicals in the process;
  - Information pertaining to the technology of the process
  - Information pertaining to the equipment in the process
- Standard operating procedures;
- Preventive maintenance procedures;
- Operator training procedures;
- Contractor training procedures;
- Accident investigation procedures;
- Emergency response procedures;
- Audit program.

A copy of the marked up, as-built drawings and specifications shall be sent to the Site Maintenance Supervisor for inclusion in the PSM files. The PSM files are primarily contained in the Site Maintenance Supervisor's office.

Prior to starting up any modified facility, all necessary personnel shall be informed of the change and of the consequences of the change. Any orientation or training on the modified facility and/or modified procedures shall be completed before start-up. The Site Maintenance Supervisor or OSHA/EPA Compliance Coordinator shall be responsible to ensure that this communication of a change and training has been accomplished.

Process Safety Management Program
Ammonia Refrigeration Facility

Management of Change Form (MCF)

MCF Number _____

This number is to be assigned by the Site Maintenance Supervisor and is to be referred to in all documentation.

Listing of key personnel involved with the change:

Originator
(please print) _____

Site Maintenance Supervisor
(please print) _____

Regional Engineer
(please print) _____

OSHA/EPA Compliance Coordinator
(piease print) _____

MCF NUMBER _____

SECTION 1: INITIATION OF MANAGEMENT OF CHANGE FORM

Section 1 is to be completed by individual originating the MCF and forwarded to the Site Maintenance Supervisor.

ORIGINATED BY: _____ **DATE:** __/__/__

PRIORITY OF REQUEST: (CHECK ONE)

- ☐ CHANGE REQUIRED IMMEDIATELY. Affected portion of system should not be operated until change is implemented.
- ☐ Urgent - System can be operated with special care until change is implemented.
- ☐ Important - Significant safety implications of change.
- ☐ Routine - Minimal safety implication of change.

REASON FOR REQUEST: (CHECK ONE)

- ☐ Incident Investigation Recommendation (Ref. No. _____)
- ☐ Mechanical Integrity Audit Recommendation (Ref. No. _____)
- ☐ Pre-start Safety Review Recommendation (Ref. No. _____)
- ☐ Process Hazard Analysis (Ref. No. _____)
- ☐ Change in Refrigeration Requirements
- ☐ Expansion or Renovation of Facility or Systems
- ☐ Other (Explain)

DESCRIPTION OF TECHNICAL BASIS FOR CHANGE (PURPOSE, ALTERNATIVES, REFERENCE SKETCHES OR DRAWINGS):

MCF NUMBER _____

SECTION 2: SCREENING OF MANAGEMENT OF CHANGE FORM

Sections 2 is to be completed by the Site Maintenance Supervisor and then a copy of the MCF is to be forwarded to the OSHA/EPA Compliance Coordinator. If the requested modification constitutes a **change**, Sections 2-6 **must** be completed.

Reviewed by: _____ Date: __/__/__

ASSESS TECHNICAL BASIS OF CHANGE

The modification as described in Section 1 is classified as:

Technical Basis	Assessment	Next Action
Is the change a replacement in kind?	☐ Replacement in kind	Change is not part of MOC procedure.
	☐ Change is not a replacement in kind	MOC procedure must be followed.
Is the modification a major or minor change?	☐ Modification is a minor change	Process hazards analysis may not be required.
	☐ Modification is a major change	Process hazards analysis is required.
Is the change permanent or temporary?	☐ Change is permanent	
	☐ Change in temporary	Fill in section on MCF concerning duration of change.
Is the change necessary, consistent with company policy, and an acceptable course of action?	☐ Yes	Change should be forwarded for preliminary engineering.
	☐ No	Change should not be implemented.

MCF NUMBER _____

DURATION OF CHANGE

If the change is temporary, note duration here: _____

No temporary change shall be granted more than five one week extensions or be allowed to extend beyond six weeks, including any extensions. The table below should be used to track temporary changes.

SCHEDULE FOR TEMPORARY CHANGES

	Initiation Date	Expiration Date	Authorization
Initial request			
Extension #1			
Extension #2			
Extension #3			
Extension #4			
Extension #5			

UPDATING PROCESS SAFETY INFORMATION, PROCEDURES, AND DOCUMENTATION

Identify the process safety information which needs to be revised as a result of this change.

_____ Process flow diagrams
_____ Piping and instrumentation diagrams
_____ Electrical one-line drawings
_____ Fire water and sewer system drawings
_____ Ammonia equipment lists
_____ Ammonia instrumentation lists
_____ Criteria for design and operation
_____ Standard operating procedures
_____ Preventive maintenance procedures
_____ Operator training procedures
_____ Accident investigation procedures
_____ Emergency response procedures
_____ Audit program
_____ Computer software (screens/controls)
_____ Other (describe): _____

_____

_____

_____

SECTION 3: PRELIMINARY ENGINEERING

Preliminary design reviewed by: _____ Date: _/_/_

MCF NUMBER _____

SECTION 4: SAFETY AND HEALTH REVIEW

Date Safety and Health Review Completed __/__/__

Does the safety and health review address the impact of change on safety and health?

☐ Yes ☐ No (Check One)

Safety review checklist reviewed by: _____ Date: __/__/__

SECTION 5: PROCESS HAZARDS ANALYSIS (IF ANALYSIS IS PERFORMED)

Date Hazard Analysis Completed __/__/__

Does the process hazards analysis address the impact of change on safety and health?

☐ Yes ☐ No (Check One)

Hazard analysis report reviewed by: _____ Date: __/__/__

SECTION 6: STARTUP AUTHORIZATION

Date Pre-Startup Safety Review Completed __/__/__

Have all applicable drawings, procedures, and documentation noted in Section 2 been revised accordingly? ☐ Yes ☐ No (Check One)

Have all appropriate operators, maintenance personnel, and contractors been informed of and trained in the change? ☐ Yes ☐ No (Check One)

Have all, if any, recommendations from the preliminary engineering, safety and health review and the process hazards analysis been resolved? ☐ Yes ☐ No (Check One)

Authorization may be given to accept this change and proceed with start-up of the modificatic if and only if the answers to all of the above questions are "Yes".

Authorization for change and start-up is given by:

Site Maintenance Supervisor: _____ Date: __/__/__

Compliance Coordinator: _____ Date: / /

Management of Change Forms (MCF) Log

MCF Number	Date MCF Initiated	Date of Initial Review	Date Initial Engineering Completed	Date Safety Review Completed	Date Hazard Analysis Completed	Date Pre-Startup Safety Review Completed	Date for Authorization of Change	Start-Up Date

D-2 Management of Change Procedures - Petroleum Refinery

The following example provides guidelines for a management of change procedure for a petroleum refinery. It includes a management of change checklist and a flow chart which outlines the various steps necessary to complete a change.

safety policies & procedure

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MANAGEMENT OF CHANGE PROCEDURE

PURPOSE

To provide guidelines for Management of Change procedures within the Refinery.. The overall aim is to successfully stream changes to the existing facility or any new facility safely.

This procedure also meets the requirements of the API RP750 Management of Process Hazards and OSHA's 29 CFR 1910.119 Process Safety Management of Highly Hazardous Chemicals.

SCOPE

The Management of Change Procedure should be used when a change, either temporary or permanent, is made to process chemicals, technology, equipment, procedures and facilities within the Refinery that requires a change in the Process Safety Information. This will cover, but is not limited to, such changes as:

- Changes in feed stocks and new chemicals (including additives) outside design specifications.
- Changes in health conditions (e.g. heat, noise, radiation).
- Physical changes, including piping, exchangers, pumps, control valves, instrument or electrical controls and tubing revisions.
- Use of rented or leased equipment attached to any process, laboratory or distribution unit.
- Changes in specifications or metallurgy of exchangers, control valves, pumps and transmitters.
- Changes in specifications of electrical systems and relief systems.
- Additions or changes of any Advanced Controls.
- Temporary changes, including pipe clamps or patches, wire wrapping or pumping of block valves, stopples and bypassing of interlocks.

Where the impact of the change is minor and well understood, the Pre-Startup Safety Review checklist, initiated by the Project Sponsor may be used to communicate the change to the personnel involved with the change.

Exceptions to the Management of Change Procedures are:

- Operational changes made within the established operating limits (parameters) or established procedures.
- Direct replacement "in kind" of equipment or materials.. This is a replacement where basic design, maintenance and operations of the new item is essentially the same as the original item.

Approved: _____ Date: _____

Refinery Manager

I. OBJECTIVE

Management of Change will cover procedures used when changes are made to the Refinery. Temporary repairs, connections, bypasses or other modifications may be built out of operating necessity. Any change from existing design specifications in equipment, processes, chemicals, operating procedures or other areas which can have an impact on process safety will constitute the use of the Management of Change Procedure. Any of these changes can introduce new hazards or compromise the safeguards built into the original design. Since the refinery is subject to continual change to increase efficiency, improve operability, accommodate technical innovation and implement mechanical improvements, care must be taken to understand the process safety implications of any changes made and document and communicate the changes to the proper personnel.

II. DEFINITIONS

A. Project Sponsor

The Project Sponsor is the originator of the request for a plant change. Through close interface with the Technical Department, Maintenance Department, Safety Department and the Operations Department, everyone must assure that the changes to the refinery are designed and constructed to maintain a safe operation of the facilities. He/she is to coordinate responsibilities with the respective departments to insure that the Management of Change Checklist is completed, facilitating full integration of the facilities into the existing refinery. It is the responsibility of the Project Sponsor to coordinate activities of the departments involved with the change and assign responsibilities to department representatives. Monitoring progress through all phases of the project includes: Pre-Management of Change review meeting, environmental review, monitoring construction, training, pre-startup safety review meeting, seeing that construction drawings are updated and full project completion.

B. Permanent Changes

A permanent change covers such changes in process technology such as feed stocks, new product development, change in catalyst and changes in operating conditions outside of the design parameters. Equipment changes include materials of construction, piping changes, equipment specifications, experimental equipment, process control revisions and changes in alarms and interlocks.

C. Temporary Changes

Temporary changes are changes to the process or equipment for a defined perior These changes will need to be tracked to make sure they are not forgotten. Example of temporary changes are hot taps, stopples, pumping or wire wrapping block valves pipe clamps or patches and bypassing safety equipment (i.e. interlocks, safety relie valves). Temporary changes must identify a plan to return the change to origina design or specifications. This can include adding the repair to the next schedulec turnaround work list or scheduling a shutdown to return the change to original design.

II. DEFINITIONS (Continued)

D. Management of Change Checklist

A Management of Change Checklist is used to identify responsibilities and duties necessary to put the plant change in service. A Plant Change applies to any change, temporary or permanent, made to process chemicals, technology, equipment, procedures and facilities within the Refinery that requires a change in the Process Safety Information. It is the project sponsor's responsibility to see that the checklist is approved by the person responsible for completing the items on the checklist. An approval signature or a N/A is required next to the duties listed in the checklist, along with signatures at the bottom of the checklist before the change is implemented. This will cover, but is not limited to, such changes as:

1. Changes in feed stocks and new chemicals (including additives) outside design specifications.
2. Changes in health conditions (e.g. heat, noise, radiation).
3. Physical changes, including piping, exchangers, pumps, control valves, and instrument or electrical controls.
4. Use of rented or leased equipment attached to any process, laboratory or distribution unit.
5. Changes in specifications or metallurgy of exchanges, control valves, pumps, transmitters, electrical systems and relief systems.
6. Additions or changes of any Advanced Controls.

E. Variance

A variance procedure has been established to incorporate situations which may develop and cannot wait for the normal Management of Change Procedure to be implemented. The Management of Change Variance Procedure Checklist is to be used when a process or equipment change is required to maintain safe unit operation or prevent environmental violations. It asks for the scope of the change, the reason it is necessary, the safety, health and environmental considerations, alternative to installing the equipment and the person or persons responsible for approving the variance. The original Variance Checklist should be kept and attached to the Management of Change Checklist. The next business day, the Complex Operating Supervisor will identify the project sponsor and will initiate the standard Management of Change Checklist to verify and document the plant change.

The Variance Checklist can also be used when items such as updating construction drawings, updating process and equipment information manuals and stocking warehouse parts cannot be completed before the project is put into service. The Variance Checklist will be attached to the Management of Change Checklist for approval before putting the change in service. Both checklists will be sent to the Process Safety Manager to track the variance items to completion.

II. DEFINITIONS (Continued)

F. Pre-Startup Safety Review Checklist

A Pre-Startup Safety Review Checklist will be used to verify that all requirements are met before the change is put into service. The checklist is used as a final check to ensure that the change is complete, training has taken place, Process Safety Information is updated and, if required, a Process Hazard Analysis has taken place and recommendations addressed.

A Pre-Startup Safety Review Checklist may also be used as a means to track minor and well understood changes. The checklist, initiated by the Project Sponsor, can be used to communicate changes that are minor and well understood to the departments involved in the change. Examples of changes which this checklist can be used for are: changes in chemicals which perform the same function, changes to equipment information which affect only one department and temporary repairs. Examples of temporary repairs are: pumping valve packing or bonnets and installation of pipe/clamps or patches. Temporary repairs or changes require plans be implemented to return the equipment to original design or specifications.

III. RESPONSIBILITIES

It is the responsibility of the Project Sponsor to coordinate activities of the departments involved with the change. Monitoring progress through all phases of the project include: Management of Change review meeting, environmental review, construction, training, pre-startup safety review meeting, initial start-up, seeing that construction drawings are updated and full project completion. The Management of Change Checklist will be the document to verify that all necessary requirements have taken place before the change is put into service. The first step in initiating the Management of Change Procedure is scheduling a Pre-Management of Change Meeting.

A. Pre-Management of Change Meeting

The Project Sponsor will initiate a Pre-Management of Change Meeting with all departments associated with the change. This meeting is the first step in initiating the Management of Change Procedure. Its purpose is to communicate to everyone involved with the change the operating objectives, the maintenance requirements, delegation of responsibilities and any safety or environmental hazards associated with the change. During this meeting, the change will be explained, responsibilities will be assigned to each department for implementing the change, identify whether a Process Hazard Analysis is required and set a timetable of when the change is to be put in service. The responsibility and completed columns of the Management of Change Checklist should be assigned to individuals who are responsible for seeing that the respective items are completed. The PSM Coordinator from Operations will assign a number to the change to be used to track the change to completion.

III. RESPONSIBILITIES (Continued)

A. Pre-Management of Change Meeting (Continued)

The Project Sponsor may call additional meetings to get updates from the people responsible for the checklist items. The Management of Change Checklist include the following sections which may apply to the change. Items not applicable can be designated by a "N/A".

1. Design Review

The Project Sponsor shall identify the need for the change and assist, as necessary, the Mechanical Engineer or Process Engineer in the development, review and approval of the proposed plans, work scope and the following drawings, if applicable:

a. Piping and Instrumentation
b. Plot Plan Arrangement
c. Safety Provisions (fire water lines)
d. Process Flow Diagrams
e. Vessel Drawings

The Project Sponsor will need the approval of the Operations, Maintenanc Environmental, Technical and Safety Departments before the field construction can begin. The Project Sponsor is responsible for initiating the Environmental Review Procedure (attached) and reviewing the Environmental Checklist with the Environmental Engineering Department. An Environmental Checklist will accompany any Budget or AFE quality request for cost estimate.

Additional information which will be discussed at the meeting may include:

a. The technical basis for the proposed change.
b. The impact on safety and health of the people involved in operating and maintaining the process. This includes changes to process safety information and hazard communication information.
c. The proper authorization to implement the change. Signatures on the bottom of the MOC Checklist will authorize the change to be put into service.
d. Length of the change. If temporary, a plan to return the change to normal or original specifications must be identified.

III. RESPONSIBILITIES (Continued)

A. Pre-Management of Change Meeting (Continued)

2. Operator and Maintenance Training

Employees involved in the process shall be informed of and trained in the change, as early as practical, prior to its implementation. It may include training on equipment, piping additions, process controls, design intent of the change and safety and environmental concerns. This may include classroom, on-the-job and/or refresher training. The Operations and Maintenance Supervisors will be responsible for identifying and approving the training necessary to operate and maintain the change. Maintenance training may require more than one group to be trained (i.e., Machinist, Instrument, Metal Trades). Other departments may provide resources to train the personnel effectively.

3. Process Information Updated

This would include Operating Procedures and the Operations Process and Equipment Information Manuals. The Operations Unit Supervisor would usually be responsible for seeing that these are updated. The Refinery Safety Policies and Procedures Manuals and the Emergency Response Manual will be updated by the Safety Department with information forwarded to them by either the Project Sponsor or the Operating Unit Supervisor. All equipment information should be forwarded to the departments in charge of maintaining the equipment change. Examples of equipment information needing updated are Instrument and Electrical files, Inspection and Mechanical Engineering files and Machinist files. Information requiring updating in the MERIT System will be sent to the MERIT Coordinator.

4. Safety

The Operating Supervisor shall update the Safety Section in the Operating Process and Equipment Information Manual to incorporate periodic surveillance of any new safety equipment installed within the new or modified facilities. The EH&S Department shall be contacted to evaluate the need for additional safety equipment (gloves/face shield, signs, hazardous area identification, etc.) Recommendations will be reviewed at the Pre-Startup Safety Review meeting. If a Process Hazard Analysis is required, recommendations made which require completion before startup must be addressed. The Safety Engineering representative is responsible for approving this section.

III. RESPONSIBILITIES (Continued)

A. Pre-Management of Change Meeting (Continued)

5. Supplies and Spare Parts

The Process Engineer will initiate or coordinate the purchase orders for the first order of items such as catalysts and chemicals. He/she will provide adequate information to the Operating Supervisor and/or the Maintenance Supervisors for subsequent orders. MSDB's must be obtained for all new chemicals before the change is put into service. The Operating Supervisor is responsible for updating the chemical inventory list of that unit and notifying the Industrial Hygienist of any changes. New chemicals or catalysts should be discussed at the training session. Spare parts should be in the warehouse prior to startup.

6. Process Control and Implementation

If changes to the process control are required, refer to the Advanced Control Applications-Development and Implementation procedures found in the Computer Engineering Process Control Department. Checklists and sign-off sheets for changes that impact the Honeywell control system and/or existing software changes are to be filled out to document the change.

7. Facilities Ready to Stream

A Pre-Startup Safety Review will be performed on new facilities and on modified facilities for which the modifications require a change in the process safety information. The Pre-Startup Safety Review shall confirm prior to putting the piece of equipment in service or startup of a unit that the following will take place:

1. Construction is in accordance with design specifications. This includes a P&ID review along with a field inspection.
2. Safety, operating, maintenance and emergency procedures are in place and have been reviewed.
3. If required, a Process Hazard Analysis has been completed on the process piping and procedures and all recommendations necessary for startup have been completed or addressed.
4. All operating procedures are in place and training of all operators and maintenance craftspersons involved with the process has been completed.

III. RESPONSIBILITIES (Continued)

A. Pre-Management of Change Meeting (Continued)

7. Facilities Ready to Stream (Continued)

The Pre-Startup Safety Review team will consist of members of the same departments that are associated with the change. A Pre-Startup Safety Review will be held when all the above items are in place and before the modification is ready to be put in service. The Pre-Startup Safety Review Checklist should be used to verify that all the necessary requirements in the checklist have been completed or addressed. Items that require completion before startup must be put on a "punch list" and signed off complete by the Operations Supervisor on shift before startup. The Project Sponsor is responsible for setting up the Pre-Startup Safety Review meeting.

All construction drawings will need to be updated in the master file within the drafting department. Construction drawings include plot plans, spool, electrical, underground, civil and structural steel support drawings. If these can not be updated before the change is put in service, the change should be marked on the drawing and sent to the drafting department. A Management of Change Variance Checklist also needs to be filled out and attached to the MOC Checklist and to the marked up drawings. This varience will be used to track the change to completion.

IV. DEPARTMENT CHECKLISTS

Separate Management of Change Checklists can be used when a change is made to equipment within a department that has little or no effect on other departments. Some examples covered in these checklists are changes where the design specifications remain the same, such as equipment manufacturers and improved product quality. Bypassing interlocks and changes to Honeywell schematics also require a department checklist. Examples and descriptions of these checklist are attached.

8/24/92
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Unit:_____ Project Sponsor:_____ MOC#_____

Project:_____

Process Engineer:_____ Permanent Change:_____

Mechanical Engineer:_____ Temporary Change:_____

Inst./Elect. Engineer:_____ Length of Change:_____

	Responsibility	Completed	
1. Design Review			
A. Process Engineering			Date:
B. Environmental			Date:
C. Operations			Date:
D. Safety			Date:
E. Project Engineer			Date:
F. Maintenance			Date:
			Date:
2. Training Completed			
A. Operator			Date:
B. Maintenance			Date:
			Date:
3. Process/Equip. Information Updated			
A. Process/Equip Manual			Date:
B. Oper./Emerg.Proced			Date:
C. Emerg. Manual/Proced			Date:
D. Safety Manual/Proced			Date:
E. I/E Equip. Information			Date:
F. Rotating Equip. Info			Date:
G. Fixed Equip. Info			Date:
4. Safety			
A. Equipment in Place			Date:
B. Hazard Analysis			Date:
C. Recommend. Comp.			Date:
5. Supplies and Spare Parts			
A. Chemicals/Additive			Date:
B. I/E Parts			Date:
C. Rotating Parts			Date:
D. Fixed Equip. Parts			Date:
6. Process Control			
A. DCS Change Comp			Date:
7. Facilities Ready to Stream			
A. Pre-Startup Review			Date:

The Following Signatures of Approval Must Be Signed Before The Plant Change is Put Into Service. The Original Checklist Should Be Sent To The Process Safety Manager With Copies Kept With The Engineering Package And Sent To The Below Signatures.

Project Sponsor: _____ Date:_____

_____ Date:_____ _____ Date:_____

Process Engineering Supervisor Operations Complex Supervisor

_____ Date:_____ _____ Date:_____

Maintenance Superintendent Safety Engineering Supervisor

ACTION	RESULT
STEP 1	
Work order, AFE, or change request is initiated by the Project Sponsor.	Work is identified.
The Project Sponsor identifies the scope and purpose for the change.	Reason for the change.
A plan is made on how the change is to be incorporated into the refinery.	Timetable, schedule, funding or special requirements are identified.
Construction Drawings are made to identify where the change will fit into the refinery.	Identifies tie-in locations.
STEP 2	
Set up a Pre-MOC Meeting with the department representatives involved with the change.	The change is identified to the department representatives.
- Review design intent of the change.	
- The purpose for the change is explained.	
- Responsibilities are assigned to the Management of Change Checklist.	
- Determine whether a Process Hazard Analysis is required.	The Safety representative will assist in decision.
- A MOC number will be assigned by the operations coordinator.	To be used to track the change to completion.
- Determine whether an Environmental review is required.	
STEP 3	
A Process Hazard Analysis will be conducted on the change.	The Project Sponsor will schedule the Process Hazard Analysis and the HAZOP Coordinator will conduct the PHA
- Recommendations from the PHA will need to be addressed before startup.	
STEP 4	
The Management of Change Checklist is completed.	Responsibilities assigned during the Pre-MOC meeting are completed.
STEP 5	
A Pre-Startup Safety Review is held to verify the change is ready to be put in service.	All refinery personnel affected by the change have been notified or trained in procedures involving the change.
- Punch List items identified.	A Punch List can be used to identify items needing completion after the PSSR and before startup.
STEP 6	
The Change is put into service. The completed MOC Checklist and PSSR checklist are sent to the Process Safety Manager.	Project is closed after the completed MOC and PSSR forms are sent to the Process Safety Manager.

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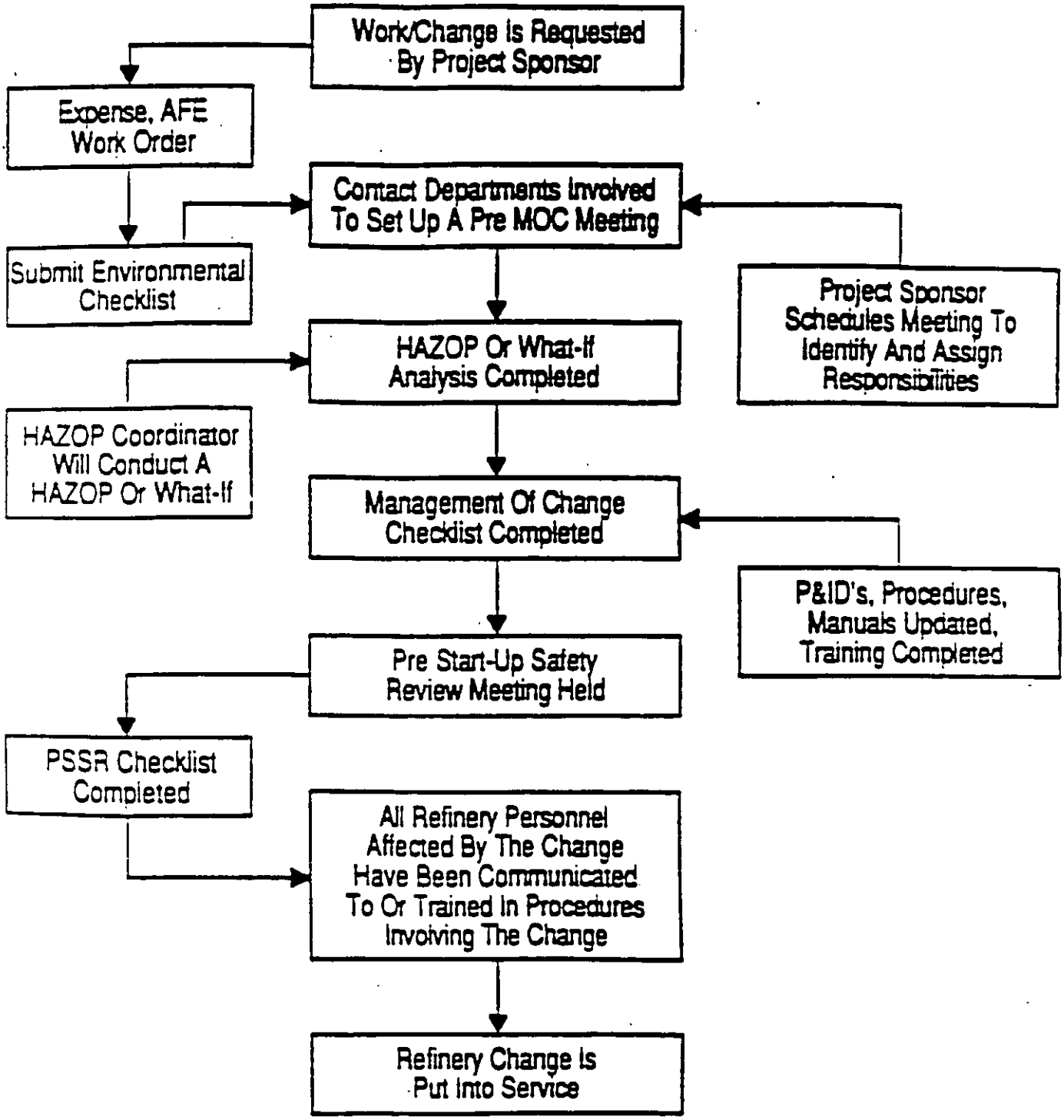
Management Of Change Flow Chart



MANAGEMENT OF CHANGE BENEFITS

1. All refinery changes are reviewed with personnel that are involved with the change. Input from all departments is used to stream the change without unit disruption.

2. Responsibilities are assigned at the beginning of the project to let people know what is required of them.

3. A Process Hazard Analysis identifies potential hazards associated with the change and recommends safeguards to avoid those hazards.

4. The Process Safety Information is updated and current before the change is put in service. This includes all Construction drawings, Process and Equipment Information Manuals, Operating Procedures, Equipment Information and warehouse parts stocked.

5. Operations and Maintenance personnel are trained to operate and repair the equipment before the change is put in service.

6. A Pre-Startup Safety Review adds the final check on the refinery change to verify that all requirements necessary to put the change in service have been met.

7. Projects are put in service with very little follow up to complete the necessary documentation.

8. Safety and Reliability are improved with communication and training associated with the change before it is integrated into the refinery.

mocsteps
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