Second Annual Symposium, Mary Kay O'Connor Process Safety Center
"Beyond Regulatory Compliance: Making Safety Second Nature"
Reed Arena, Texas A&M University, College Station, Texas
October 30-31, 2001

Potential Impacts to Process Safety Management from Mergers, Acquisitions, Downsizing, and Re-Engineering

Jack Philley
DNV Houston
16340 Park Ten Pl Ste 100
Houston TX 77084

Phone: (281) 721-6781
Email: jack.philley@dnv.com

ABSTRACT

Significant potential impacts to process safety management performance can be generated by corporate organizational mergers, acquisitions, downsizing, and re-engineering. This paper explores a selection of consequences (favorable as well as unfavorable) and presents possible options for addressing this new and broad based challenge. Loss of in-house PSM expertise and surge capacity is a prime example. Demographics indicate a bell curve of experienced personnel in the process industries are approaching normal and early-retirement age. Rapid expansion of the process industries in the 1960's and 1970's brought in a large group of workers. Retraction of the process industries in the late 1980's significantly reduced the number of people entering this segment of the workforce. These two events have combined to generate a bell-curve distribution of experienced personnel, who are now leaving the industry as a result of downsizing, mergers, and other re-organizations. Retention of this experience is a serious challenge to successful management of process safety. There is an increasing likelihood lessons learned may be permanently lost.

POTENTIAL IMPACTS TO PROCESS SAFETY MANAGEMENT FROM MERGERS, ACQUISITIONS, DOWNSIZING, AND RE-ENGINEERING

2001 Mary Kay O'Connor Process Safety Center Symposium
Beyond Regulatory Compliance, Making Safety Second Nature
Jack Philley, CSP
DNV Houston, 281 721 6781 jack.philley@dnv.com

1 OBJECTIVES

Corporate organizational mergers, acquisitions, downsizing, and re-engineering can generate significant impacts to Process Safety Management (PSM) programs and ultimately to PSM performance. Almost every organization has experienced some degree of change in organizational staffing. A primary objective of this paper is to identify potential adverse impacts to PSM resulting from ineffectively managed organizational changes. Several process safety incidents are examined from an organizational change perspective. In addition, options and strategies are offered for preventing or mitigating adverse consequences associated with these changes.

2 INTRODUCTION

2.1 Background

Virtually every organization experienced some degree of re-organization, re-structuring or downsizing in the past ten years. Total employment in the top 500 largest companies decreased 20 % between 1984 and 1994. As many as 75% of businesses experienced reengineering (1). General Electric eliminated over 100,000 jobs (out of just over 400,000). In one survey 94% of companies engaged in downsizing (2). *The New York Times* reported 21 million workers downsized between 1989 and 1999. These numbers do not include those people who changed jobs voluntarily due to loss of confidence or job security. Permanent employee headcount has been a major focus point. Mid-management is the group most effected. This group also has a very high percentage of experienced workers, who are aware of process hazards and who have personal knowledge of how the operational systems and safeguards function and malfunction.

According to US Department of Labor statistics, worker tenure declined significantly from an average of 15 years to 10 years, during the period 1983 through 2000 (3). There is a "baby-boomer" bulge in the worker population demographics. Boomers are approaching early retirement stage of their career, and will begin exiting the workforce soon. One analyst identified a new phenomena, "Corporate Anorexia (4)", caused by excessive downsizing. The Delta Airlines 20% reduction in size in 1994 (15,000 people) generated the term "dumbsizing". Loss of technical staff has been accompanied by reduction in the total aggregate amount of site specific knowledge related to process hazards, safeguards, and the functions of the PSM management system.

2.2 Definitions

The variety of terms related to downsizing and reorganization is impressive. Sometimes little differentiation is made regarding the precise meaning of terms such as *downsizing, rightsizing, Reduction in Force (RIF), re-organizing, restructuring* and *re-engineering.*

For the purposes of this paper the term downsizing is used in the context of "*A company's reduction in the number of employees, number of bureaucratic levels, and overall size, in an attempt to increase efficiency and performance"(*5). For the purposes of this paper the term re-engineering is used in the context of *"The fundamental rethinking and radical redesign of business processes to bring about dramatic improvements in performance" (1).* Re-engineering is not the same as reorganizing, restructuring, or downsizing.

Other terms in this general category include *dumbsizing, corporate anorexia, brightsizing,* and *outsourcing.* Second and third generation terms and technologies include Business Process Reengineering (BPR) and Object Oriented Analysis (OOA). It is easy to become confused with such coined terminology, as exemplified by this webpage quote, "*Business Process Re-engineering (BPR), combined with the power of Object Oriented Analysis (OOA) can form an integrated, intelligence-based foundation for the conception, representation, development, and implementation of unique workplace processes which are responsive to a company's requirements to efficiently serve their customer's needs*" (ref Intelligent Manufacturing, April 1995, Lionheart Publishing).

The PSM impacts resulting from downsizing are not necessarily identical to impacts created by re-engineering or re-organizations. PSM is complex and is composed of many sub-systems, interactions, functions, and communications. In re-organizations total staff headcount may remain constant, but individual duties and responsibilities can change significantly. In mergers/acquisitions there is sometimes an initial duplication or overlap of staff and PSM performance criteria standards. Some PSM program components are independent and can be effectively handled at the plant level (example: hot work permits), while others are dictated by corporate policies, procedures, and culture (example: risk matrix categories). Several PSM activities represent relatively new industry practices, (example: formal management-of-change (MOC) systems and inclusion of Safety Instrumented Systems (SIS) Analysis as a portion of the Process Hazard Analysis study).

2.3 Baseline PSM Staffing

Before examining potential adverse effects to PSM generated by downsizing or re-organizational changes, it is important to recognize "normal" PSM program staffing changes. Some PSM staffing changes are the result of natural PSM management system life-cycle evolution, and should not be attributed to organizational changes. These changes would occur in a stable organization and are not attributable to downsizing or re-structuring. In addition to "normal" PSM staffing changes, mergers and acquisitions can generate legitimate changes (reductions) in PSM program staff where there is clear staff duplication.

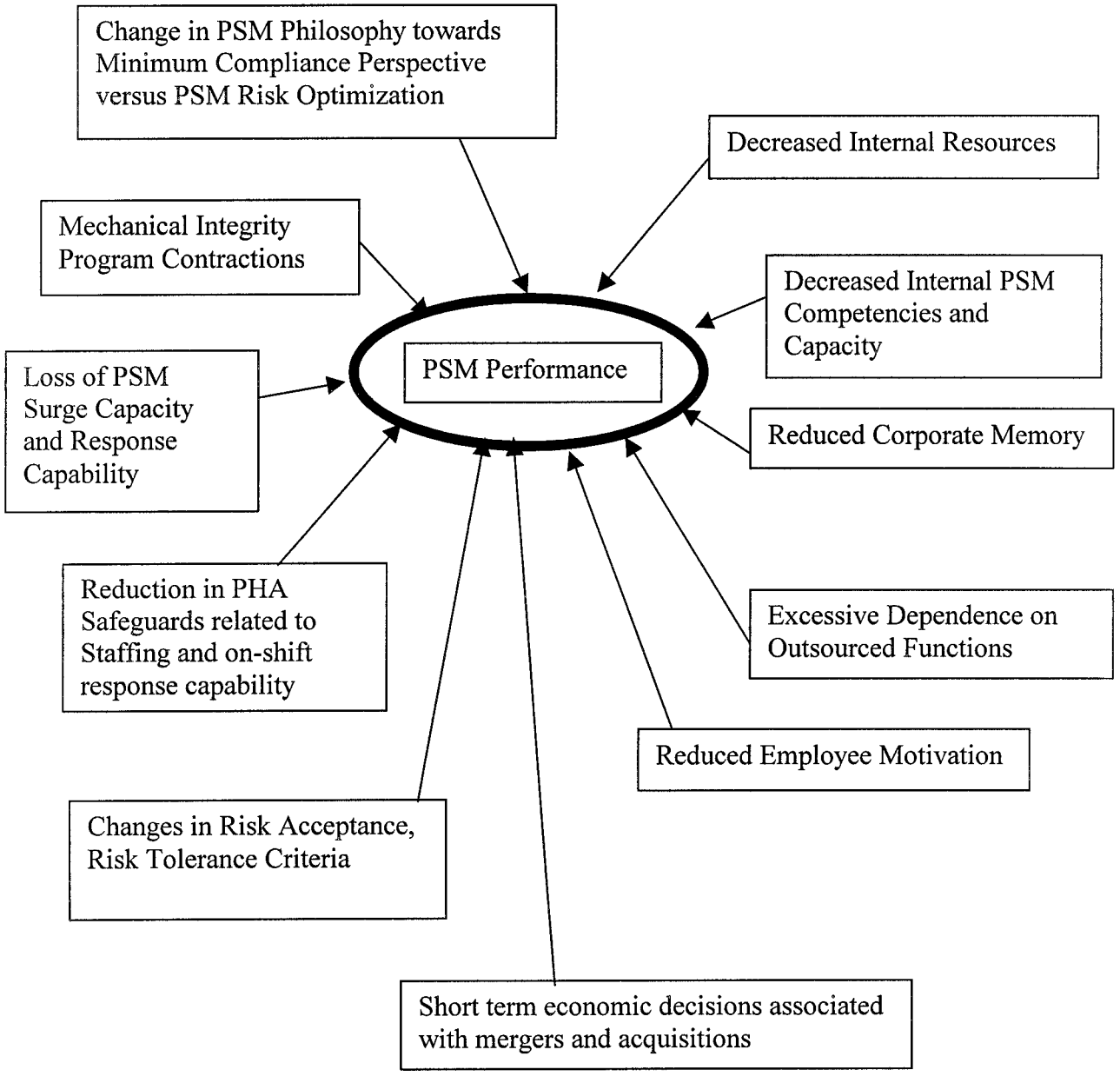
Implementing a fully integrated PSM system that meets accepted industry practices and applicable regulations (such as OSHA 1910.119 and EPA RMP requirements), has built-in variations in staffing resource needs. These staffing needs vary among organizations and include include:

- complexity of the chemical processes and reactions,
- complexity of the control systems,
- the PSM program starting point,
- internal corporate culture,
- size and competence of existing in-house PSM resources, and
- maturity of the process (how well-known are the hazards, operation, and process systems understood)

PSM staffing resource needs are non-linear. Some PSM staffing reductions should be viewed as natural and normal changes to program resource needs. Intital development and implementation of a PSM system requires more resources than those needed to sustain an ongoing mature program. After some initial period, there will be a natural reduction in resource needs. The PSM "staff" can be reduced without adverse impact to the PSM program results. In the early 1990's many organizations created special temporary task forces to develop, train, and initially implement formal PSM management systems. After a period of six to eighteen months, these task forces completed their objectives and the task force team members returned to their previous or other assignments. Actual timing of PSM program development and implementation in 1990-1993, corresponded closely with widespread major downsizing, mergers and re-organizations. As a result of these two simultaneous events, some normal PSM staffing reductions were obscured by larger scale corporate re-organizations and downsizing events.

Even in mature PSM systems, there will be normal and natural employee turnover and movement. The PSM management system should be configured to handle a limited amount of employee turnover and progression. One characteristic and benefit of a "*management systems*" approach, is that the system anticipates a limited rate of personnel change and has features built-in to provide for continuity in the event of a temporary or permanent absence of an individual person.

Figure 2.1: POTENTIAL ADVERSE IMPACTS TO PSM PROGRAM EFFECTIVENESS



3 POTENTIAL ADVERSE IMPACTS TO PSM SUCCESS

3.1 Decreased Internal Resources

Reductions in PSM program resource staffing levels are commonly associated with downsizing and re-organizations. Immediate adverse consequences from PSM staff reductions are not always easy to identify. PSM is designed to reduce the frequency of catastrophic process related incidents, which by nature have a low frequency rate. Postponement of a PHA study will not usually result in an immediate and measurable process related catastrophe. Some upper management personnel do not understand the cost vs. benefits associated with successful PSM programs, and therefore the PSM staff is especially vulnerable to manpower reductions. Reductions in PSM resources are typically accompanied by an immediate re-prioritization of all PSM activities, followed by corresponding reduction in the scope of PSM system objectives.

3.2 Decreased PSM Capability

Reductions in PSM staff manning are accompanied by a decrease in the capability to manage PSM program objectives. There is a decrease in individual and collective PSM staff competencies, capacities, and aggregated experience that would otherwise be available to apply to PSM system functions. There is a loss of continuity and consistency. If the person leaving is losing his employment, he will not usually be motivated to provide a complete thorough turnover to the person or persons who will be taking over his previous duties. In many cases, the person leaves the organization long before a replacement has been identified. This creates a complete break in communications and allows the opportunity for significant degradation of PSM program activities.

3.3 Overdependence on Outsourcing

Many organizations respond to PSM staff downsizing by shifting designated PSM program functions to outside resources. The organization loses internal PSM competence and capacity, and becomes more dependant on outside assistance. There is an optimum balance between internal verses external competencies for every organization. An organization should not become overly dependant on outside resources to the point that it is at the mercy of outside vendors. The organization needs to maintain a minimum level of internal competence to at least effectively manage the use of outside technical resources. Excessive dependence on outsourcing can cause the PSM program to lose consistency and in most cases the overall cost of PSM program increases and/or the program scope is reduced. In a few cases, the original internal PSM person is "outsourced", and remains at his old desk doing much the same as before, but at reduced benefits, reduced motivation, and reduced loyalty.

3.4 Increased Risk Levels

Mergers and re-organizations can result in a shift of absolute risk exposure levels. No two organizations have exactly the same PSM culture. One organization (or plant) may have a very well developed MOC management system and a weak Incident Investigation system, while another organization (or plant) may have exactly the opposite situation. In mergers and acquisitions, there are usually differences in risk tolerance between the two

organizations. One organization may have a higher risk acceptance tolerance. The result can be an "averaging down" when the risks are aggregated. One organization may be forced to raise its' risk tolerance while the other decreases its' risk tolerance. If company A acquires an older plant from company B that has higher risk levels, it will take some time to upgrade the old plant up to the standards of the new owner. This risk reduction investment does not always receive the funding, priority and resources needed. The result is that the risk exposure levels for Company A are actually increase temporarily (or in some cases permanently).

3.5 Mechanical Integrity Degradation

Downsizing and reorganizations can have significant adverse impact on Mechanical Integrity (MI) and equipment inspection programs and budgets. Some of these changes are immediately identifiable and obvious. Other MI program changes are relatively obscure and create hidden weaknesses that are eventually manifested by increased equipment failure rates and decreased reliability. Reduced corrosion protection maintenance or preventive maintenance budgets can result in predictable decreases in useful life periods for piping and equipment, however the immediate short-term result is increased profits (from lower expenses). The long-term result is higher cost due to increased painting needs, replacement costs, and possible equipment failure. A shift in Turn-Around interval can have major impact on compliance with minimum required inspection intervals for pressure vessels, tanks, and pressure relief valves. A decrease in the number of Thickness Measurement Locations in the inspection program, can result in an increase in overall risk exposure that is not easily identifiable or obvious. Plant Engineering department staff reductions can adversely impact the timeliness and completion of deficiencies identified by the inspection program. Mechanical Integrity and Reliability program reductions can result in loss of production and increased downtime. Degradation of the MI system increases the potential for accidental releases.

3.6 PSM Program Objectives

All PSM programs are intended to prevent or minimize catastrophic process related incidents, however there is variation in the scope of PSM program beyond the minimum regulatory compliance level. Some PSM programs are only designed to provide compliance with applicable codes and regulations. Other PSM programs are intended to provide risk optimization and an integrated Health Safety and Environmental (HSE) management system. The balance point between minimum compliance and PSM optimization is dictated by corporate culture and upper management standards. Downsizing and re-organization can result in a shift more toward the minimum compliance approach. This shift can result in a decrease in internal PSM monitoring, auditing, and continuous improvement activity.

3.7 Loss of Surge Capacity

Decreases in PSM staffing can result in loss of internal capacity to respond quickly and react effectively to PSM related problems. Such problems might include PSM incidents and near-misses, response to PSM audit findings, and employee complaints. Before the advent of massive downsizing, most organizations had sufficient internal resources to handle a temporary surge in PSM program needs. Special tasks forces could be assembled and devoted exclusively to solving a specific PSM problem, accident

investigation, or program weakness. After the problem was solved, task force members added their newly gained knowledge and experience to the corporate resources. Downsizing and re-organization can result in significant loss of these internal surge capacity resources. In order to respond, the downsized organization must seek outside assistance, which adds to the overall cost and time needed to resolve the problem. At the operating level, decreases in shift manning may be adequate for normal operations, but may not consider credible abnormal events and situations.

3.8 Loss of Corporate Memory

A significant amount of PSM program strength is provided by the personal experiences of personnel who:

- serve on PHA teams,
- develop written operating procedures,
- determine what specific precautions are needed before hot work can begin,
- conduct training courses,
- diagnose operating problems, and
- respond to emergencies.

Downsizing and re-organization have significant impact on the collective corporate memory and experience level of the employees who implement and administer the day-to-day PSM program activities. In most instances the personal lessons learned and personal experience leave the organization with the downsized people.

3.9 Demotivation

Employee safety performance decreases in response to anticipated layoffs (6). Concentration is diminished. Motivation to thoroughly conduct and verify each and every required step in an operation is adversely impacted. Employees are less likely to submit safety suggestions. Employees are less likely to question a decision of supervision, because the employee does not want to be identified as a troublemaker. An employee may actually increase risk taking behaviors (such as taking short-cuts) in an effort to be seen as a highly productive worker. Employees may continue to use worn tools and equipment in an effort to try to reduce the expenses of the production unit. Another demotivating factor is employee task overload. This overload is created by reduction in staff and in-effective re-assignment of duties and responsibilities. This overload can be temporary or permanent.

3.10 Invalidation of PHA Safeguards

During PHA and HAZOP studies, certain assumptions are made related to process safeguards provided by the on-duty or available staff. A decrease in shift manning can result in invalidating some of the judgement decisions made by the PHA/HAZOP team. One common PHA team discussion is reliance on on-duty operators to detect a deviation, properly diagnose the situation, and take action within an adequate time frame to prevent adverse consequences. Assumption judgements are sometimes made by the PHA / HAZOP team as to how soon or how likely the on-duty operations staff would notice and correctly diagnose the cause of a process deviation or an out of limit reading on a process variable. Decrease in on-shift manning reduces the operating shift crew's ability to

notice a problem (such as field walkdown regular rounds), handle multiple simultaneous alarms (process upsets), and monitor secondary variables (distraction by primary alarms).

3.11 Short Term Trade-offs

Rapid turnover (or decreased tenure) of management has acted to reduce long term accountability. Some management decisions generate short term positive economic results, yet long term economic adverse consequences. Deferring a preventive maintenance painting program will decrease expenses for that year, but will likely cost more in the long run. If a manager knows he will probably not be present when the long term consequences come due, there is a tendency to take the easy (short term) path. Short term perspectives also may be involved in evaluating potential sale of a facility, in order to make the financial numbers appear to be more favorable.

4 ACTUAL INCIDENTS

4.1 Longford

On 25-Sept-1998, at the Esso Longford facility in Australia, a major gas release and fire occurred that took the life of two persons, and caused significant economic consequences. The event was the ultimate result of a series of causes and unusual circumstances, some of which were related to re-organizational changes (7). The facility was in the process of re-starting when there was an equipment failure (cold temperature brittle fracture of a heat exchanger). The equipment failure resulted in a large gas release and subsequent ignition. There were abnormal staffing conditions. According to the report of the official commission

"*...two structural changes to operations management occurred at Longford, which were relevant to the matters under investigation. These changes were the relocation of engineers from Longford to Melbourne and the redefinition of the role and responsibilities of supervisors and operators*" (8).

According to the Royal Commissions interpretation of Esso's internal management system procedures and requirements, the relocation of the engineering group required a risk assessment. A risk assessment was required but not conducted to evaluate the effect of the proposed organizational change.

At the time of the incident, there were no experienced engineers on site. The engineers had been relocated away from Longford facility. This relocation was accompanied by installation of a special communication link to provide a Process Data Transmitting System (PIDAS) that allowed Melbourne based engineers real-time access to process variables. In addition to permanent changes in staffing, there were several temporary changes in staffing that contributed to the knowledge weakness present on the day of the incident. These included:

- The plant manager was away from the plant
- The position of Operations Superintendent was vacant and the acting Superintendent was away on holiday
- The person substituting for the acting Superintendent was absent due to illness

This set of events is a clear example of the consequences of no longer having internal "surge capacity" in the technical staff knowledge pool.

4.2 Challenger

Most of us are familiar with the major causes of the Challenger Space Shuttle Disaster of 28, January 1986. Chapter Seven of the Commission Report addresses the impact of a downsized safety and quality assurance program. The chapter is titled " *The Silent Safety Program*". Between 1970 and the date of the Challenger incident, NASA trimmed 71 % of SR & QA (Safety/Reliability and Quality Assurance) department staffing. At Marshall SR&QA staff was cut from about 130 to 84. Re-structuring reduced autonomy and placed those responsible for monitoring oversights answering to the same people they were supposed to be watching. This has been dubbed an example of "*the fox guarding the henhouse*" (9, 10).

4.3 Bhopal

The worst known chemical process disaster occurred in Bhopal India in Dec 1984. There were over 3000 immediate deaths related to an accidental release of methyl- isocyanate. As with most disasters, the incident was the result of a combination of causes and events coupled together. There were multiple breakdowns in safeguard barriers. Several causes were related to organizational changes and downsizing. When the plant first started, there were 12 highly educated and trained operators for each shift. Operator education qualifications required a college degree, and many were sent out of the country for initial training. In 1983, after several years of operation, plant management decided to downsize the shift component from 12 to 6, and to correspondingly reduce the number of on-shift supervisors from 3 to 1. Education requirements for operators were also lowered. The initial size of the safety department staff was seven. By December 1984, the safety staff had been reduced to one person, and that person was not full-time.

Inadequate initial emergency response added to the casualties, in that the scrubber system circulation pump was never started, the block valves connecting the dedicated empty spare tank were never opened, and there was a delay in initial alarm response. Additional on-duty manpower might have reduced the consequences of this disaster.

4.4 Management System Approach

When implementing strategies to address potential impacts on PSM created by downsizing or re-organizations, it is necessary to understand and apply a *management system* perspective. The term *management system* has multiple applications and variations among different organizations. For the purpose of this paper, the term *management system* is used to represent the total overall system used to administer and manage a defined task. A generic management system has several components, in addition to the written policies, procedures, and actual task executions, as shown in Figure 4.1.

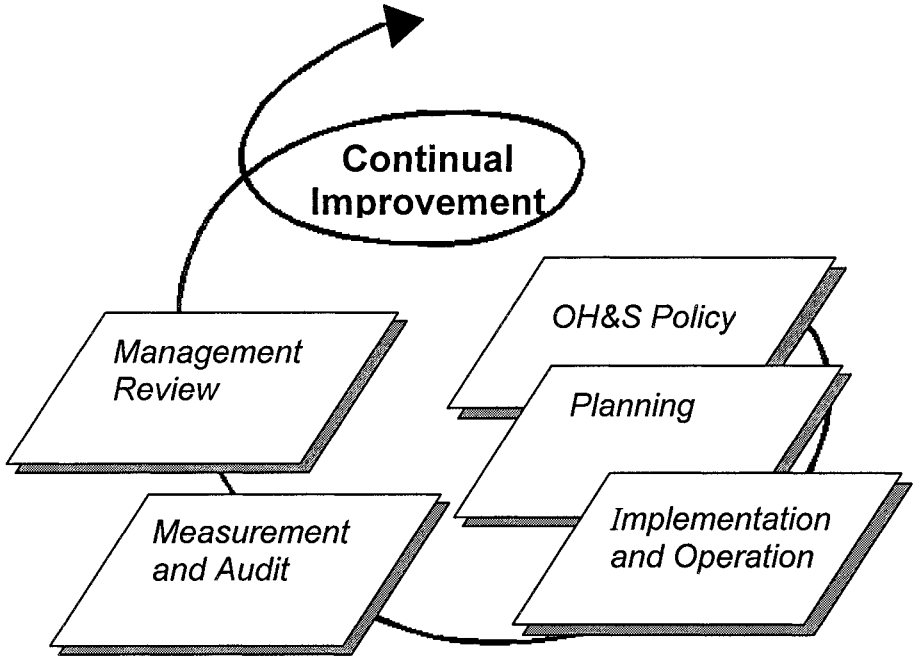
The management systems approach to safety has been recently endorsed by several organizations. The American Petroleum Institute developed two guides (9100 A and 9100 B) for *Environmental Health and Safety Management (EHS) Systems* (11). In 1999 The British Standards Institution issued specifications for HS Management Systems, OHSAS 18001 *Occupational Health and Safety Management Systems Specification* (12). OHSAS 18001 is intended to compliment the ISO 14001 Environmental Management System Standard. A management systems approach includes several program requirements, functions, and components in addition to the traditional written policy and procedure.

Management System =

The entire formal administrative system designed to accomplish an identified activity, along with associated procedures, training, resources, specific tasks, assignment of authority, documentation, monitoring, accommodations for changes and deviations, follow-up, and continuous improvement components.

The relationship between PSM success and management systems is significant. Most PSM accidents can be traced to a weakness or defect in one or more PSM management systems. Successful function of a management system is not a one-time event, and requires continuous effort and dedication of resources. Only a small fraction of PSM activities are one-time implementation events, such as updates to Process Safety Information drawings and database. Most PSM activities represent repetitive activities (hot work permits for example). Each PSM program element should be developed and implemented as a management system. In all cases the implemented management system should be monitored, audited, and periodically re-evaluated to ensure it is properly designed, systematically enforced and consistently applied.

Figure 4.1: Continual Improvement Diagram



A prime example of a PSM management system is the *Operating Procedures* function. There are defined outputs, there is a training component, and there are prescribed documentation requirements which need periodic review and update. Task allocation and decision authority levels are established. Successful Operating Procedures require dedication of sustained management support and resources. There is a need for periodic updating due to physical system changes as well as changes in organizational staffing (normal attrition, promotions, and minor adjustments to task allocations). The Operating Procedures management system has several training components, such as training personnel on how to:

- use an individual procedure,
- write a new procedure,
- review and update an existing procedure, and
- train existing personnel on new or revised procedures.

There is a periodic refresher training component to the Operating Procedures management system. In the context of a "management systems" perspective, the Operating Procedures management system can be adversely impacted in several ways by downsizing or re-organizatrion. Each of these potential impacts to the management system should be identified and evaluated. Consequences of an incomplete or improperly functioning management system can be significant as evidenced by the Longford, Challenger and Bhopal incidents. In each of these cases, the Management-of-Change management system did not produce the desired results.

5 POSSIBLE SOLUTIONS / STRATEGIES

The following options and strategies may be applicable for minimizing adverse PSM program impacts caused by organizational changes.

5.1 Formalize the Existing PSM System and Activities

Convert as many PSM activities as reasonably practical into a formal and systematic documented set of expectations and information. This strategy does not require any change to existing PSM policies, activities or procedures. This strategy will "institutionalize "corporate PSM knowledge and will help to ensure consistency in understanding of expectations, responsibilities, and how things are supposed to be done and documented. A formalized "system" will greatly assist during personnel transition periods. The resulting PSM program will be less dependant on the unique qualification of any one individual person. The PSM program will be less vulnerable to the effects of unplanned/ unanticipated personnel changes.

During initial development, implementation, and start-up phases of the PSM compliance program, in many organizations, one designated person acted as the internal PSM champion/sponsor/expert. That one designated person gained exceptional knowledge and insight as to how the system worked. In many cases, this knowledge was not captured in any documentation. As a result, the organization's PSM program becomes vulnerable to significant impact caused by the loss or transfer of the one internal expert. If, on the other hand, these insights and lessons learned can be incorporated into a formalized and documented system, the PSM program has a better chance to survive personnel changes and re-organizations.

5.2 Management System Approach

A more effective approach beyond just formalizing existing PSM activities would be to implement a *management system approach* to PSM. Each of the PSM program elements should be established as an individual management system with all the components discussed in Section 4. In addition, there should be an overall PSM management system developed and implemented to ensure optimum synergy between elements and to minimize duplicate documentation. It is usually beneficial to devote resources to integrate PSM program activities with other related HSEQ activities such as incident investigation. The management system approach provides additional protection from adverse effects of personnel turnover. A management system approach benefits from the built-in monitoring and continuous improvement components.

5.3 MOC Personnel Changes

Personnel or organizational changes are not included in the scope of many existing MOC systems. These changes are usually evaluated separately from the normal MOC review and approvals. One option for minimizing the PSM adverse impacts caused by personnel changes, is to expand the scope of the MOC system to include all personnel changes, and require that potential PSM impacts be identified and evaluated as part of the review and approval step.

5.4 MOC Secondary Effects

In cases where the MOC system does include personnel changes, it is important to extend the MOC review to seek to identify and evaluate all possible secondary effects (those beyond the immediately obvious impacts). This level of scrutiny requires an in-depth understanding of all normal as well as abnormal job duties and job knowledge requirements of the positions involved in the change. One example is the secondary impact on the on-shift emergency response team that is created by reducing operator shift staffing. Downsizing the normal operating shift size will have an effect on the capacity of on-duty personnel to handle emergencies. Shift staffing must consider both normal as well as credibly abnormal situations, such as immediate and safe emergency shutdowns and re-starting a process unit after an unplanned trip-out/ shutdown. When conducting a Management-of-Change review for any organizational personnel change , it may be necessary to review the previous PHA (HAZOP) study to ensure that existing safeguards identified by the PHA team will not be adversely affected by the reduction in shift staffing.

5.5 MOC Broad Scope

When evaluating potential affects of a proposed change, it is important that the MOC review include a broad scope of both immediate, as well as long term and possibly latent impacts. Changing the staff resources available for routine mechanical integrity tests and inspections will have both short term as well as long-term effects. Inspection intervals may be extended. Latent failures may remain in place longer before they are detected. The risk associated with a particular failure scenario is dependant both on the likelihood as well as the consequence. When an inspection interval is extended, there can be an increase in risk as a result of a shift in position in the risk-matrix.

5.6 Capture and Share Lessons Learned

Organizational staff changes act to reduce the on-site knowledge and experience level. One counter measure is to capture and effectively publicize those lessons (positive and negative) learned from actual experience. Trevor Kletz says "Organizations have no memory, only people have memory" (13). In order for an organization to benefit from lessons learned, it is necessary for these lessons first to be captured. The capture system must be user friendly and should be accessible by all employees whose job is affected by the lesson learned. It does no good for the information to be kept in a warehouse of archived materials, or to be blocked by corporate legal access restrictions on investigation findings. The lessons need to be incorporated into operator and new technical personnel training programs, training manuals, and periodically publicized. Sometimes a photograph on permanent display in a lunch room can help preserve organizational memory and lessons learned.

5.7 Internal Knowledge Net

With the advent of retrieval databases, search engines, and intra-company computer networks, a new tool is now available for proactive sharing of specific process safety knowledge. Some organizations have established internal "knowledge networks" to provide a repository of accident prevention skills and information. Diagnosing and

troubleshooting guides have been established. Computer based training programs have been developed and implemented.

5.8 Incident Investigation Protocol

Another potential strategy to minimize adverse impacts to the PSM system created by organizational changes, is to ensure that incident investigations examine and determine if any organizational changes contributed to the incident or near-miss. This scrutiny should be included in the written requirements for investigation teams, should be included in the investigation team training. This potential concern should be incorporated in guidelines and checklists to ensure that this task is completed and documented by the investigation team.

5.9 Pre-exit Information Download

When there is a planned departure from the organization, one option is to conduct and document a series of focused interviews to download specific PSM related information from the person who is about to leave the organization. This option is not always available, and also requires dedicated resources to gather the information and to incorporate the verbal information into PSM program documentation (such as training manuals).

5.10 Stand-by Consulting Agreement

Some organizations have established formal contract agreements with retirees, to provide the capability of an immediate part-time consulting resource for PSM related activities. This arrangement has the added benefit of providing a less abrupt change for the organization and for the person who is retiring. Retirees can be extremely helpful as members of Process Hazard Analysis (HAZOP) teams, audits, operator training and refresher training sessions, incident investigations, and Mechanical Integrity activities (such as major turn-arounds).

Table 5.1: STRATEGIES AND OPTIONS FOR EFFECTIVE PSM DURING ORGANIZATIONAL CHANGES

☑	1. Convert existing PSM program into a formal (documented) system
☑	2. Apply a management systems approach
☑	3. Modify MOC system to include all organizational and staffing changes
☑	4. Modify MOC system to include identification of secondary changes and adjustments caused by organizational and staffing changes
☑	5. Modify MOC system to identify broader/deeper scope of potential economic impacts (search for the obscure and long-term impacts)
☑	6. Capture and share PSM lessons learned in retrievable format/system
☑	7. Internal Knowledge Network – accessible database, user friendly
☑	8. Expand investigation protocols to require organizational change impacts
☑	9. Pre-exit information download
☑	10. Stand-by consulting agreements

6 SUMMARY/CONCLUSIONS

The degree of downsizing and re-organization in recent years has been unprecedented. It is generally accepted that PSM program effectiveness can be adversely affected by downsizing and re-organizations. Downsizing and re-organizing can result in significant loss of in-house PSM competence, capability, and experience. Mergers and acquisitions can result in inconsistent standards and incomplete PSM documentation practices. Downsizing and re-organizations often generate significant interruptions in PSM continuity and PSM program momentum.

There are several potential strategies and options that can be applied to reduce potential adverse consequences associated with downsizing and re-organizations. Applying a *management systems* approach will provide a PSM system that is less sensitive and vulnerable to individual personnel changes. A comprehensive Management-of-Change system can address many of the partially obscure consequences. A system to capture and share collective lessons learned, can function to partially replace the collective loss of experience created by departing workers.

Some amount of organizational change is normal, appropriate, necessary, and in-evitable, if an organization is to continue to prosper. Improvement itself requires change (from one state to another). All change is accompanied by some degree of risk. Successful changes require up-front identification of potential consequences and dedication of resources.

7 REFERENCES

1. Hammer, Michael and Stanton, Steven A. *"The Reengineering Revolution"*, Harper Business, Harper Collins Publishers, NY, 1995, ISBN # 0-99730-736-1
2. *Downsizing or Dumbsizing, The Restructuring of Corporate America* by Carri Jenkins, Brigham Young Magazine, Spring 1997
3. US DOL Monthly Labor Review July 2000, Arlene Dohm , *Gauging the labor force effects of retiring baby-boomers.*
4. *"Downsizing's Effects on Safety in the CPI / HPI"*, Friedlander, Randal H and Perron, Michael, Presentation to AIChE Conference, July 1995
5. Bloomberg Financial Glossary (www.Bloomberg.com)
6. *"Is Corporate Re-Engineering Hurting Your Employees* " Withehill and Kolak, Professional Safety Magazine,May 1996
7. Boult, M. Kenney G, Pitblado R *"Lessons Learned from the Longford Royal Commission Investigation into the Explosion and Fire on 25 th September 1998 at the Esso Gas Processing Plant"*, CCPS International Conference on Accident Investigation, American Institute of Chemical Engineers, Orlando conference
8. *"The Esso Longford Gas Plant Accident, Report of the Longford Royal Commission"* , Government Printer , State of Victoria, Australia (available on Internet)
9. *Silent Safety Program* – Challenger Chap 7 The Presidential Commission on the Space Shuttle Challenger Accident Report, June 1986, pages 152-161
10. Vaughn, Diane, *"The Challenger Launch* ", University of Chicago Press, Chicago 60637, 1996, ISBN # 0-226-85175-3
11. API 9100 A & B, *Model Environmental Health and Safety Management System*, American Petroleum Institute, Washington DC, 1998
12. OHSAS 18001 – *Occupational Health and Safety Management Systems Specification*, British Standards Institute, 1999, London UK
13. Kletz, Trevor "Lessons from Disaster: How Organizations Have No Memory and Accidents Recur," Institution of Chemical Engineers/Gulf Publishing Co., Houston, TX, 1993.