Chemical Safety Program Assessment Project

Report on the Roundtable Meeting held on June 13-14, 2000 at the George Bush Presidential Conference Center, College Station, Texas

Mary Kay O'Connor Process Safety Center
Chemical Engineering Department
Texas A&M University System
College Station, Texas 77843-3122

July 2000

Chemical Safety Program Assessment Project

Report on the Roundtable Meeting held on June 13-14, 2000 at the George Bush Presidential Conference Center, College Station, Texas

Mary Kay O'Connor Process Safety Center
Chemical Engineering Department
Texas A&M University System
College Station, Texas 77843-3122

Current funding for this project is provided by:

American Chemistry Council
Chemical Emergency Preparedness and Prevention Office-U.S. EPA
The Chlorine Institute, Inc.
Conoco, Inc.
Dow Chemical Company
Huntsman Corporation
Mary Kay O'Connor Process Safety Center
Occupational Safety and Health Administration-U.S. DOL
Process Safety Consortium at the Mary Kay O'Connor Process Safety Center

July 2000

SUMMARY OF MISSION AND NATIONAL GOAL

The Chemical Safety Assessment project has been underway for more than a year and much progress has been made. The project began with the objective to develop a methodology for chemical safety program assessment and to apply the methodology in an analysis of the impact of various programs for prevention of accidental releases of reactive, flammable, and toxic chemicals from stationary sources. At the first meeting of the Roundtable in June 1999, we reached an agreement as follows:

> ***Reduce chemical process accidents to zero while building public trust through community interaction.***

This agreement came, of course, after a great deal of discussion on a variety of alternatives and the sorts of characteristics the project should possess. With this background and the initial discussions within three workgroups, we moved onto the October 1999 session.

In October 1999, group discussion focused on how progress towards the First Roundtable Agreement could be accomplished, measured, and demonstrated. A variety of parameters and metric tools were presented for discussion by the workgroups. Intense discussion followed on the means by which the First Roundtable Agreement would be implemented.

A Steering Group was formed to identify the steps necessary to implement the First Roundtable Agreement. The Steering Group recognized that the objective of this project needed to be clarified in order to ensure all stakeholders are working toward the same goals. It was also acknowledged that an expanded understanding of the First Roundtable Agreement was needed to make the project relevant to the different audiences interested in this project. These audiences include diverse groups such as the general public, local community, employees of the facility, shareholders of a company, emergency response agencies, government regulatory agencies and others.

In several meetings over the next few months following the October 1999 Roundtable meeting, the Steering Group worked to expand and clarify the First Roundtable Agreement in an effort to advance the project. The Steering Group adopted the First Roundtable Agreement as the Mission Statement. As a result of First Roundtable Agreement, a National Goal was adopted as follows:

> ***Chemical incidents are zero; chemical enterprises have earned the public's trust; and public, government, and facility interactions improve safety and reduce risks.***

It should be clarified that while the members of the Roundtable have identified a National Goal we can all work toward, in is not the responsibility of the Roundtable itself to ensure the accomplishment of that National Goal. Rather, it is the responsibility of the individual stakeholders within the Roundtable to work toward accomplishing the National Goal and provide their results to the Chemical Safety Assessment process in order to evaluate the overall improvement in chemical safety in this country. It is the responsibility of the Roundtable to assess the accomplishments of the stakeholders in the context of the National Goal. Thus, this project will assist us all in identifying the successes and areas for improvement in chemical safety.

The national goal can be broken into three sub-goals and measurement systems for tracking progress on these three sub-goals are needed:

- A method to track progress in reducing incidents to zero
- A method to track progress in building public trust
- A method to track the effectiveness of public, government, and facility interaction

Potential measures/indicators to track progress in reducing incidents to zero

The indicators for measuring progress with respect to this goal will be:

1. Trend in total number of incidents
2. Trend in the number of facilities reporting incidents including the percent of facilities reporting (this, of course requires knowing the universe of facilities).
3. Trend in publicizing near-misses. (The difficulty with this indicator may be the inability to define a near-miss. Efforts at Wharton may help define a near-miss).
4. Trend in the use of safety culture building programs
5. Trend in the level of effort to install prevention programs

As to the indicator, "Trend in total number of releases", the group agreed that the criteria and characteristics that will make up the report on an incident should include:

- The appropriate items from the definition of incident
- Quantities released
- Severity of consequences
- Ownership
- Those items that are in the various reports submitted to governments

Potential measures/indicators to track progress in building public trust

It is important to note here that if there was a reliable incident database, and it showed improvement, that would by itself have a positive effect on public trust. While there are some indicators that could be measured or tracked, there is general agreement that

information from the repository as well as surveys may be needed to track progress in building public trust.

Surveys to track trends could be targeted to specific audiences

- First responders
- Employees
- Media
- Local community

Negative measurements, which would indicate lack of progress, are as follows:

- Number of complaints to government agencies (i.e., the use of hot lines)
- Disputes over permits, rezoning, expansions
- Citizen lawsuits not damage suits
- Rapid employee turnover
- Injuries, evacuations
- Number of FOIA's

Positive measurements indicating progress in building public trust include:

- Percent of people living in a certain radius who are comfortable with where they live
- Facilities and local governments who contribute resources (dollars, equipment, people) to LEPCs/SERCs
- Number of opportunities for public participation
    - CAPs, public hearings, environmental justice programs
- Property values – up or down because of proximity to a facility
- Percent of facilities that allow independent third party audits and make information publicly available.

Important indicators that are especially hard to measure are:

- The tax structure, which should reward "good actors." Public perceptions of those tax exemptions as funds being withheld from the community.
- Number of sources public can use to verify information.
- Product sales trends. Public support or boycott of a product.
- Attitude of the press.
- Level of person from company/government/community who show up to address a concern. Does the facility have a face?
- Improvement in relationships between labor/management and government.
- Number of programs supported by parents who allow their children to spend time on-site at a facility – summer employment.
- Percent of companies who take pro-active measures to go beyond compliance (e.g., early RMP rollouts, public release of RMP executive summary).

- Number of community outreach and education programs and dollars spent on those programs.
- Number of facilities that train with local responders.
- Distances of plant manger's/senior managers' homes from the facilities.
- Number of facilities with on-site child-care centers.

Potential measures/indicators track the effectiveness of public, government, and facility interaction

Public, government, and facility interaction may take place in various forms. The effectiveness of these interactions could be judged by improvements in plant operations and overall safety performance. Additionally, the successful collaboration of government, industry, and the public can be shown through expanded promotion of chemical safety and understanding of chemical risk nationally. Examples of indicators include:

- Facilities that have reduced their chemical risk by practicing inherently safer approaches. Some examples include:
    - replacing hazardous chemicals with less hazardous chemicals
    - reducing chemical inventories
    - improving chemical processes etc.
    - improved safety activities

- Reduction of risk factors (i.e. chemical accidents, high inventories, etc.) at facilities that participate in safe practices/chemical safety programs (i.e., OSHA's voluntary protection program; RMP audits, ISO 14000, EMS, Responsible Care)

- Reduction of
    - chemical incidents
    - amount of chemicals released
    - environmental effects

- Improved chemical safety at facilities that:
    - have active LEPCs on which they participate
    - voluntarily provide chemical information
    - participate and provide information to the Chemical Safety Assessment project

- Percent increase in government/facility partnerships, (i.e., audits, outreach, etc.)

- Increase by state government in promotion of chemical safety at local level through (training, funding, etc.).

- Increase in number of communities which have infrastructures in place to

    - promote facility/government/public interactions, and/or

    - promote access to chemical information to the public

- Increased interactions between industry, government, and/or public, which result in reduced chemical risk to the community.

- Percent increase in quality of commitment to chemical safety activities (i.e., LEPC/SERC participations, etc.)

WORK PLAN

In order to track progress towards the national goal; several activities are needed. It must be pointed out that the efforts of the Roundtable attendees cannot directly accomplish the National Goal. In fact, in order to attain any degree of progress towards the National Goal, activities and tasks must be accomplished by many others at the local and the national level. The work plan outlined here addresses some of the activities, which in opinion of the Roundtable are essential to move forward.

Repository design for incidents, public trust, community/facility interactions

In order to track progress in accomplishing the national goal, the first thing that is needed is a repository of information for the various indicators. The factors that should be considered in developing the repository design are as follows:

1. What are good, available indicators for the national goal?

2. Are there good repositories that contain information on these indicators?

3. Who owns the repository for this information?

4. Who manages the repository for this information?

Some of the activities that need to be accomplished before a satisfactory repository can be functional are as follows:

1. Refine the repository development process
2. Develop proposed data, input criteria and characteristics
3. Interaction with agencies: inform and ask for access and cooperation in coordinating the development of an integrated national system
4. Use RMP 5-Year data and put in place a mechanism to make it available to public via LEPCs
5. Develop a proposal to establish a process so that when an accident occurs, it is possible to select inputs (elements) from existing data bases/sources to which an accident is reported, and creates an acceptable tracking system.

It is quite clear that in order to track progress in accomplishing the national goal, a repository of information is necessary. However, a repository itself may not be sufficient to track progress in all the three goals. The repository described below can provide complete information for tracking progress in reduction of incidents. In order to get complete information regarding progress in building trust and community interaction focused and directed surveys may be necessary.

The following definitions apply to incidents and all other aspects of this assessment project.

"Chemical Enterprise" includes production, packaging, storage, distribution, use and disposal of chemicals at fixed facilities and in transportation.

"Incident" includes any sudden unintended release of or exposure to chemicals that does or could reasonably have resulted in injuries, death evacuation, shelter-in-place, or significant environmental or property damage (exceeding $25,000, where damage is defined as replacement cost for property and equipment on-site and off-site that is damaged in the incident. Business interruption loss, product loss, and environmental clean-up costs are not included).

"Near miss" is an "incident" avoided by chance. This definition is not intended to exclude near-misses where the consequences were avoided because of location, such as releases from a pipeline or unoccupied facility in a remote area.

"Public" includes everyone interested in the process or procedures represented in these goals.

The repository will consist of incidents covered by the definition given above. In the future when consensus regarding the definition of near-misses is reached and collection of near-miss data becomes routine, the repository might be expanded to include the near-miss data.

Repository taxonomy

For each entry in the repository, the following information shall be considered for inclusion. The following items reflect a combination of items included in the definition of "incident," items suggested during the June 13-14, 2000 Roundtable meeting, and items commonly reported in various incident databases. Also, an effort was made to cover all items needed to track progress towards the national goal. The following first set was selected primarily for tracking progress in reduction of incidents.

- Date and time
- Facility name
- Dun and Bradstreet number
- SIC code
- On-site property damage
- Off-site property damage
- Chemicals released
- Quantity released
- Release description (i.e., to air, water, or ground)
- Source
- Duration

- Number of serious injuries
- Number of fatalities
- Use of off-site responders
- Was general public notified (Y/N)
- Population protection measures
- Short description
- Initiating event
- Root cause
- Contributing causes
- Changes introduced
- Covered by PSM
- Covered by RMP
- Last regulatory enforcement
- Status of process line at time of spill
- How release was discovered
- Number of facility employees injured
- Number of facility employees hospitalized
- Number of facility employee deaths
- Number of contractors injured
- Number of contractors hospitalized
- Number of contractors deaths
- Number of general public injured
- Number of general public hospitalized
- Number of general public deaths
- Number of responders injured
- Number of responders hospitalized
- Number of responder deaths
- Number of contractors evacuated
- Number of contractors sheltered-in-place
- Number of employees evacuated
- Number of employees sheltered-in-place
- Number of general public evacuated
- Number of general public sheltered-in-place
- Frequency of hazard analysis studies
- Date of last hazard analysis
- Prevention program description
- Release location:
    - Process Vessel:
        A) Wall
        B) Overflow
        C) Vent
        D) Drain
        E) General

    - Storage
        A) Wall

B) Overflow
C) Vent
D) Drain
E) General

- Valve
  - A) Flange
  - B) Seal
  - C) Body
  - D) General

- Piping
  - A) Flange
  - B) Joint
  - C) Elbow
  - D) Wall
  - E) General

- Pump
  - A) Flange
  - B) Seal
  - C) Body
  - D) General
  - E) Other

The following items (needed primarily for tracking progress in building public trust and community interaction) may or may not be available. Potential methods for acquiring the information should be determined. Most of the following are not available from existing data sources. Voluntary surveys and/or benchmarking exercises should be considered.

- CAP existence
- Average number of CAP meetings per year
- LEPC existence
- Average number of LEPC meetings per year
- LEPC has reviewed facility RMP (Y/N)
- LEPC revised local emergency plan based on facility input
- LEPC has a community right-to-now program
- Number of lawsuits against company
- Number of complaints by public to company
- Number of complaints by public to regulatory agencies
- Number of community events in the last year
- Number of facility tours for the public in the last year
- Total hours of volunteer activities by facility in last year
- Existence of agreements with community (Y/N)
- Average management turnover in years
- Age of facility

- Average distance of management team residence from the plant
- Number of employees at the site
- Part of a larger corporation (Y/N)
- Average number of hours of professional activity (conferences, seminars, workshops)
- Average number of training hours for employees
- Average years of experience for employees
- Safety is part of incentive package for all employees (Y/N)
- What percent of compensation for management is tied to safety
- What percent of compensation for employees is tied to safety
- Age of near-miss program
- Number of near-misses in last 5 years
- Reduction of chemical inventory
- Improvements in chemical processes
- Replacing chemicals with less hazardous chemicals
- Improved safety activities

Information Collection

The following approach to developing a repository was recommended by the committee. This approach recognizes the significant resources that are currently expended by numerous agencies and the desire to take advantage of these efforts and the data that has been collected for some years in the past. It also recognizes that there are shortcomings in these systems, including lack of root cause, inconsistent taxonomy, limitations to public access, limitations and overlap in scope, and duplicate reporting requirements.

Information Flow

Incidents are normally reported to the National Response Center (NRC), which enters them into a database. This would become the starting point for tracking incident reporting and investigation through the relevant agencies. The Repository Manager would insure that all incidents that were appropriate to a particular agency passed through that agency and were then incorporated into the integrated system. The Repository Manager would handle incidents that did not fall in the jurisdiction of any agency. The Repository Manager would supplement the reporting as needed and vet the information. The Repository Manager would also monitor news media and other sources for incidents that were not reported to the NRC. The Repository Manager would then electronically submit these incidents to the NRC.

Integrating the Systems

The Repository Manager with input from the Roundtable would identify all the existing data sources and compare the scope and content of each. This overall scope would then be compared to the desired scope as expressed by the Roundtable.

Authority

The CSB has a statutory authority to collect data regarding chemical incidents. If the CSB chooses to exercise this authority, it could be used to collect additional data (about certain incidents or about incidents) not normally covered by the other agencies. Incident reporting already addressed under NRC requirements or other regulations should not require additional redundant reporting.

Reporting Agencies

Those agencies identified to date are summarized in an attached spreadsheet (Appendix A).

The Mary Kay O'Connor Process Safety Center is currently working on two tasks:

- To further develop the repository development plan described above.

- To make a detailed evaluation of the existing data sources, the scope of incidents covered and the information reported and identify their shortcomings, gaps and overlaps. Recommendations will be developed for improving public access, and consistency amongst the data sources.

Appendix B provides the current draft of the Repository Development Plan and the projected plans for tasks under the second bullet (Note: Appendix B represents incomplete work-in-progress and should be viewed as such. Comments and suggestions regarding Appendix B contents should be provided directly to the Center).

The Center is the preferred Repository Manager for the following reasons:

1. The Center provides an academic/research setting, which hopefully instills higher degree of confidence and credibility in the repository.

2. The Center researchers and students as well as visiting researchers will be able to assist in the filtering, vetting, and review of repository information. In addition, the Center has access to experienced Systems Analysts, Information Systems Specialists, and other Computer Science Specialists. These personnel can assist the Center in the development and maintenance of the Repository on an as-needed basis, i.e., part-time, full-time, temporary, and/or permanent. The need for hiring and training large computer systems staff can therefore be avoided.

3. The Center in collaboration with the Center for Study of Digital Libraries (CSDL) at Texas A&M will be able to provide greater access and analysis capability for the repository data. A member of the global digital library research community, the CSDL provides a focal point for digital libraries research and technology for the State of Texas. The CSDL mission is to foster pioneering research on the theory and application of digital libraries and to create flexible and efficient new

technologies for their use. CSDL staff includes experts in key new technologies required for digital libraries: electronic document modeling and publication, hyperbase systems, process-based and spatial hypermedia systems, collaborative systems, and computer-human interaction.

4. A large pool of graduate students is available for development and maintenance of useful application and analysis tools. This is a significant issue since graduate student usage and analysis of the repository will yield useful information and conclusions. In addition, the research project of the graduate students here at the Center as well as other places will hopefully be influenced by the application and analysis of the repository information.

5. The continuation of the Roundtable activities is intricately tied to the repository and Roundtable input to the repository development and maintenance will be accomplished relatively seamlessly.

Use of repository information

Some of the expected uses of the repository information are as follows:

1. Preparation of periodic Chemical Safety Assessment Reports

2. Assessment of credits for improvements in safety

3. Targeting of risk reduction measures

4. Assessment of effectiveness of programs and activities and identification of gaps in improving chemical safety

It must be pointed out here that this project started because of the need to develop a Chemical Safety Assessment Report. The information that exists currently is not reliable or accurate. However, it is not advisable to wait till a "completely reliable and accurate" repository is available. The project group is working on preparing and releasing the first Chemical Safety Assessment Report in about six months. The objective is to develop a routine of being able to publish this report periodically. However, the first report should not be viewed and used as a "baseline" against which all future activities would be measured. Because of the time constraints and limitations on the data available for the first report, it would be unfair and inaccurate to use it as a "baseline." The advantages and compelling reasons for starting publication of assessment reports are:

1. In order to be able to win approval and support of others not involved or familiar with the Roundtable activities, we must be able to demonstrate concrete and tangible progress.

2. Vacuums are usually filled with hot air and debris. Thus, data that is imperfect should be used prudently to avoid the predicament. In using the imperfect data, methods for validating or correcting the information can be developed.

3. The first report should be able to provide glimpses to all stakeholders how the information can be used for analysis and improvement of their own operations. Thus, the first report and the subsequent reports would not only help accomplish buy-in to the project but more importantly in the long run cause stakeholders at all levels to work towards making the national goal a reality.

The preliminary contents of the Chemical Safety Assessment Report are as follows:

0 Executive Summary
- Audience
- What the report is/isn't

1 Background
- Purpose
- History and summary of the project and the CSAR
- Strategy - vision, mission, national goals, and indicators

2 Where we are in the nation in the area of chemical safety
- Analysis of data based on indicators
- Status of chemical safety
- National trends
- Accident causes, problem areas
- Prevention techniques/ideas
- Specific examples
- Databases – pros/cons - quality of data, data gaps
    - How complete are the data, what do we know, what don't we know?
    - Need for a national chemical incident repository

3 Where we are going
- Next steps - with analysis/databases/etc.
- Future reports
- Feedback opportunities

The content of the report may change as we gain experience and more information becomes available. However, it is important that the following characteristics be maintained:

- Easily understood by all stakeholders
- Easily accessible
    - internet
    - printed version
    - easily copied
- As appropriate, explore the need for publishing the report in other languages
- Less text - More graphs

- Use of columns
- Further information page - web hot links
- Feedback via the internet as well as through the printed version
- List of participants - acknowledgement of Roundtable participation

As mentioned earlier, the content and format of the Chemical Safety Assessment Report will quite naturally evolve in the future. The goal would be to publish this report annually. However, it should be recognized that at the beginning as efforts to streamline repository development are underway, it may not be meaningful to publish the reports annually. As the repository of information discussed earlier becomes operational, mature, and reliable, future Chemical Safety Assessment Reports will potentially have the following additional features:

- More in-depth trend reports
- How stakeholders are using data/report
- Comparison of data from previous reports
- Status report of Roundtable
- Changes/adjustments to indicators
- Begin measuring success driven by report
    - how are stakeholders using data and is that improving chemical safety
- Recommendations/successes/gaps
    - key elements of successful programs
    - institutional barriers

Performance Improvement and Project Outreach

The impact of this project in accomplishing the national goal will depend to a large extent on getting all stakeholders at the local and national level to do their part. Some of the activities in this respect for the short term are:

- Get FEMA involved in the project (as part of the contact with NRT)
- Get all reporting agencies involved in the project (as part of the contact with NRT)
- Marketing plan for all phases of project
    - Website for Chemical Safety Assessment Project (All roundtable participants must link to this site) - MKOPSC
    - "Vest-pocket" speech to be developed for all Roundtable members to use frequently and share with CEOs etc. for delivery – Tim G
    - Roundtable members should advertise their support of the National Goals/Chemical Safety Assessment Project and extend to new supporters
    - Promotional material
        - 1-page brochure tri-fold - MKOPSC
        - Produce video presentation
        - Recognition certificate for all participants - MKOPSC
    - Provide incentives for stakeholders to participate in project (recognition, logo, incentives, etc)

        - Example - Facilities learn where they stand
        - Benchmarking of activities
            - Example - average time for HAZOP implementations
        - LEPCs could learn about work of other LEPCs
- Series of "what works" reports
- Set up "feedback process" for products and ensure comments are addressed.
- Get evaluation/benchmarking expert involved to help Roundtable figure out "what does this information mean?" Need to facilitate "next steps."
- Increase awareness of the project with Public (Public's expectations drive action.)
- Clarify - Not membership in project, rather, agreement/commitment to National Goal
- Consider prevention hierarchy as part of vision, goals framework
- Develop meaningful steps to address gaps in meeting goals

APPENDIX A
Summary of US Chemical Release Incident and Injury Databases