



**BUILDING
PROCESS SAFETY
CULTURE:
Tools to Enhance
Process Safety
Performance**

CCPS
CENTER FOR
CHEMICAL PROCESS SAFETY

20
YEARS

An **AIChE** Industry
Technology Alliance

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Center for Chemical Process Safety of the American Institute of Chemical Engineers

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It is sincerely hoped that the information presented in this document will lead to an even more impressive safety record for the entire industry; however, neither the American Institute of Chemical Engineers, its consultants, CCPS Technical Steering Committee and Subcommittee members, their employers, their employers' officers and directors, warrant or represent, expressly or by implication, the correctness or accuracy of the content of the information presented in this document. As between (1) American Institute of Chemical Engineers, its consultants, CCPS Technical Steering Committee and Subcommittee members, their employers, and their employers' officers and directors, and (2) the user of this document, the user accepts any legal liability or responsibility whatsoever for the consequence of its use or misuse.

Foreword

As the complex technical and managerial discipline of process safety has matured, our ability to analyze and assert control over adverse outcomes has reached to deeper and deeper levels. At first, we sought to assess blame on the parties causing accidents: the operator who didn't follow procedure, the engineer who chose the wrong material of construction, or the supervisor who botched the work safety permit. Later, we learned to question management systems; were the procedures in fact possible to follow, was the engineer given enough time and resources to choose the correct material, or did the supervisor received adequate training? Over the years, we have also seen numerous examples of failures on an even deeper level, at the level of organizational culture. This did not come into clear view until the final months of 2003.

On January 21, 2003, members of the CCPS Technical Steering Committee had the opportunity to observe in person the strong safety programs employed by NASA. During a visit to the NASA Kennedy Space Center, with the Space Shuttle Columbia poised on the launch pad, we observed first hand an exceptionally well-constructed safety program: spotless housekeeping, detailed but usable and used operation procedures, precise communications, excellent task and site layout, and a willingness to learn and share safety knowledge. All agreed that we had seen the exercise of an exceptional process safety program, indeed an exceptional overall safety program.

With this foundation, the collective shock experienced by the CCPS representatives upon the loss of Columbia just two weeks later was perhaps even more profound than that of the general population. Over the ensuing months, as the facts from the incident investigation became available, there was discussion of "blindness" in the organization, caused by a failure of its safety culture.

Upon the release of the Columbia Accident Investigation Board report in late 2003, a group of CCPS representatives began meeting to see what learning might be applied to the chemical and petroleum industries from the Board's findings. Almost immediately, this group began to see examples where a weakened process safety culture had contributed to historical chemical incidents, such as Flixborough, Bhopal, and Piper Alpha. This led to further evaluation, and ultimately the creation of the material presented herein.

These process safety culture awareness and evaluation tools in this package have been utilized in a diverse range of petroleum and chemical companies, and we believe that the tools will prove useful to any organization willing to devote the time to use them. We hope you find value in these materials, and look forward to hearing how this process worked for you and how it can be improved.

Dave Jones and Anne O'Neal,
Chevron Corporation
Co-chairpersons
November 1, 2005

Acknowledgements

CCPS wishes to thank the members of the Process Safety Culture subcommittee for their dedicated efforts in developing the Process Safety Culture toolbox. Specifically, we wish to thank co-chairs Dave Jones and Anne O'Neal of Chevron, and committee members Don Abrahamson, OxyChem, Scott Berger, CCPS, Mike Broadribb, BP, Walt Frank, ABSG Consulting, John Herber, 3M, Dan Isaacson, Lubrizol, Shakeel Kadri, Air Products and Chemicals, Greg Keeperts, Rohm and Haas, Jack McCavit, Celanese Chemicals (retired), Pete Lodal, Eastman Chemical, Bill Marshal, Eli Lilly, Lisa Morrison, PPG, Mike Rogers, Syncrude Canada, and Karen Tancredi, DuPont. In a post-meeting gathering, the term "Process Safety Zealots" was proposed as an apt description for this team's dedication. Accordingly, CCPS thanks them for their zeal, and acknowledges their companies for taking the next step towards preventing process safety incidents.

The presentation and associated self-evaluation tool were developed by Dave Jones, Walt Frank, Shakeel Kadri, Mike Rogers, and Karen Tancredi. Walt Frank developed the supporting material and filled in the remaining holes. If the committee were zealots, then these dedicated individuals are the alpha zealots.

CCPS' pre-launch visit to the Kennedy Space Center was arranged, with the assistance of Shakeel Kadri and his colleagues of Air Products, by Mr. H.T. Everett and Mr. Eric Dirschka. We thank these gentlemen for openly sharing their safety programs and for their gracious hospitality.

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Table of Contents

I. The Primary Tools

- A) PowerPoint® presentation: [*Lessons From the Columbia Disaster – Safety & Organizational Culture*](#)
- B) Self-evaluation tool: [*Key Lessons From The Columbia Shuttle Disaster \(With Adaptation To The Process Industries\)*](#)

II. Instructions for Using the Package

- C) [Instructions for PowerPoint® Presentation](#)
- D) [Conducting An Organizational Culture Workshop](#)

III. Background Materials

- E) White Paper: [Safety Culture: “What Is At Stake”](#)
- F) Incident Summary: [*Columbia Case History*](#)
- G) Incident Summary: [*Challenger Case History*](#)
- H) Incident Summary: [*Piper Alpha Case History*](#)
- I) Incident Summary: [*Flixborough Case History*](#)
- J) Videos (coming soon)
- K) [Bibliography](#)

Introduction

This package of materials is built around a PowerPoint® presentation intended for use by a knowledgeable process safety professional to create an awareness among company upper management of the importance of a sound safety culture in stimulating enhanced safety performance. (It is anticipated that the package could also be effectively used more widely in the organization; e.g., for orienting site management and other personnel).

The presentation discusses six organizational culture learnings derived from the investigation of the Columbia shuttle disaster, and draws parallels to similar learnings coming from the Challenger investigation 17 years before. In doing so, the presentation illustrates the difficulty of implementing true cultural change, and the sometimes tragic consequences for failing to do so.

To show the importance of these learnings to our industries, the presentation also discusses two chemical/petroleum process industry case histories - Piper Alpha and Flixborough – and draws parallels to Columbia. Finally, the presentation is configured to allow the presenter to include one or more company-relevant case histories.

Accompanying the presentation is a self-evaluation tool that reemphasizes and elaborates upon the six Columbia learnings. For each learning, a set of probing questions is provided to allow the organization to test the relevance of that learning to their particular situation.

The Columbia learnings, while important, do not address the full spectrum of issues associated with the broad topic of organizational/safety culture. Hopefully, by gaining an understanding of the Columbia learnings, company leadership will develop an interest in delving more deeply into the broader topic. An introduction to a broader perspective is provided in the document “Safety Culture: What Is At Stake,” included in this package. This document was condensed from the chapter on safety culture in the forthcoming *CCPS Guidelines for Risk Based Process Safety*.

Additional supporting material has been provided for the benefit of the presenter. Instructions are provided for modifying the presentation to make it shorter, or to include company-relevant cases histories. Also, suggestions are provided for how these materials could be used in a facilitated exercise to reinforce the learning experience.

Recognizing that every presenter may not be familiar with the circumstances surrounding each of the four case histories in the presentation, the package includes brief descriptions of each, citing learnings that are relevant to the focus of the package.

Finally, a bibliography references additional information, including sources for the official investigation reports for the four cases histories, and other informative publications on the topic of organizational/safety culture.

CCPS hopes that this package will be of value to the user. As discussed in “Safety Culture: What Is At Stake,” enhancement of safety culture may provide the path to substantive improvements in safety performance. This package is intended to help you start on that path.