Revalidating Process Hazard Analyses

Walter L. Frank and David K. Whittle
EQE International, Inc.
This page intentionally left blank
Revalidating Process Hazard Analyses
This book is one of a series of titles published by the Center for Chemical Process Safety. A complete list of titles available appears at the end of this book.
Revalidating Process Hazard Analyses

Walter L. Frank and David K. Whittle
EQE International, Inc.
Contents

Preface ix
Acknowledgments xi
Glossary xiii
Acronyms and Abbreviations xvii

Introduction 1
Why Was This Book Written? 1
Scope of This Book 2
The CCPS Workshop 3
How This Book Is Organized 3

Chapter 1
Refresher on the Basics 5
1.1. What a PHA Is Intended to Accomplish 5
1.2. Brief Review of the More Common PHA Methodologies 6
1.3. PHA Team Make-up 9

Chapter 2
Revalidation—What Is It? 11
2.1. The Reason for Revalidation 11
2.2. Revalidation Objective 13
2.3. Revalidation Concept 13
2.4. Establishing the Revalidation Schedule 14
2.5. The Role of a Revalidation Procedure 16
Chapter 3
Preparation for the Revalidation Study

3.1. Preplan the Revalidation
   3.1.1. Establishing the Scope of the Revalidation
   3.1.2. Selection of Team Members
   3.1.3. Scheduling—Estimating Time and Resources

3.2. Identify, Collect, and Prepare Needed Information
   3.2.1. Determining Information Requirements
   3.2.2. Distribution of Information

3.3. Review and Analyze Information
   3.3.1. Prior PHA Report(s) and Related Documentation
   3.3.2. Resolution Completion Report for Prior PHA Recommendations
   3.3.3. MOC and PSSR Documentation
   3.3.4. PSM System Audit Results
   3.3.5. Incident and Near-Miss Reports
   3.3.6. Piping and Instrument Diagrams (P&IDs)
   3.3.7. Operating Procedures

Chapter 4
Evaluating the Prior PHA Study

4.1. Evaluation of the PHA with Respect to Essential Criteria
   4.1.1. PHA Rigor
   4.1.2. Methodology Used
   4.1.3. Team Make-Up
   4.1.4. Documentation
   4.1.5. Drawing the Conclusions

4.2. Evaluation of PHA Quality and Completeness

4.3. Other Considerations

4.4. Common Problems with PHAs

Chapter 5
Identifying Changes That Have Occurred Since the Prior PHA

5.1. Logging the Identified Changes

5.2. Documented and Controlled Changes
   5.2.1. MOC and PSSR Review
   5.2.2. P&ID Comparison
Chapter 6
Identifying an Appropriate Revalidation Methodology 51
6.1. Revalidation Options 51
   6.1.1. Update and Revalidate 51
   6.1.2. Retrofit, Update, and Revalidate 52
   6.1.3. Redo 53
6.2. Selecting the Revalidation Options 55

Chapter 7
Conducting the Revalidation Study Sessions 59
7.1. Team Training 59
7.2. Application of Revalidation Methodology 60
7.3. Special Topics 60
   7.3.1. Staying Productive 60
   7.3.2. Facility (or Stationary Source) Siting 61
   7.3.3. Human Factors 61
   7.3.4. Wrap-Up Discussions 62

Chapter 8
Documenting the Revalidation Study 65
8.1. Documentation Approaches 65
8.2. Report and Its Content 67
8.3. Recommendation Follow-Up 67
8.4. Records Retention and Distribution 68

Appendix A
Federal Regulatory Requirements 69
Appendix B  
**Essential Criteria Checklist**  

Appendix C  
**PHA Quality and Completeness Checklist**  

Appendix D  
**Example Change Summary Worksheet**  

Appendix E  
**Facility and Process Modification Checklist**  

Appendix F  
**Facility and Stationary Source Siting Checklist**  

Appendix G  
**Human Factors Checklist**  

*Bibliography*  

*Index*
Preface

The American Institute of Chemical Engineers (AIChE) has a 30-year history of involvement with process safety for chemical processing plants. Through its strong ties with process designers, builders, operators, safety professionals and academia the AIChE has enhanced communication and fostered improvement in the high safety standards of the industry. AIChE publications and symposia have become an information resource for the chemical engineering profession on the causes of accidents and means of prevention.

The Center for Chemical Process Safety (CCPS), a directorate of AIChE, was established in 1985 to develop and disseminate technical information for use in the prevention of major chemical accidents. The CCPS is supported by a diverse group of industrial sponsors in the chemical process industry and related industries who provide the necessary funding and professional guidance for its projects. The CCPS Technical Steering Committee selects the projects to be developed, with approval of the Advisory Board, and oversees the individual projects selected.

In 1992, CCPS published Guidelines for Hazard Evaluation Procedures, Second Edition, with Worked Examples to provide information to organizations for conducting hazard evaluations of processes handling potentially hazardous materials. While many companies had previously adopted the practice of reviewing process hazard analyses on periodic basis, there are now regulatory requirements mandating such revalidations for certain processes.

The goal of this guideline is to provide plant management, operating personnel, engineering groups, and safety professionals with supplemental information and methods to achieve well-executed revalidations, recognizing that there are many alternate routes to achieving a high level of quality in process hazard reviews.
Acknowledgments

The American Institute of Chemical Engineers (AIChE) wishes to thank the Center for Chemical Process Safety (CCPS) and those involved in its operation, including its many sponsors whose funding made this project possible, and the members of the Technical Steering Committee who conceived of and supported this CCPS Concept project.

This project was initiated as a Workshop at the September 1999 Technical Steering Committee (TSC) meeting in San Francisco. We wish to recognize the contributions of the TSC members and the Workshop speakers:

Jeff M. Gunderson, Chevron Corporation
David W. Jones, EQE International, Inc.
Mike Marshall, DOL-OSHA
Jon F. Plakosh, ATOFINA Chemicals, Inc.

In addition, W. C. (Bill) Geckler of EQE International, Inc. ably assisted in facilitating the Workshop break-out sessions.

The members of the PHA Revalidation Subcommittee who worked with EQE International, Inc. to produce this text deserve special recognition for their dedicated efforts, technical contributions, and overall enthusiasm for creating a useful addition to the CCPS Concept series.

The members of the Subcommittee were:

Dennis Blowers, Solvay Polymers, Inc.
Donald J. Connolley, Akzo Nobel Chemicals Inc.
Peter McGrath, Olin Corporation
Jon F. Plakosh, ATOFINA Chemicals, Inc.
Marty Welch, Chevron Corporation

Ray E. Witter was the CCPS staff liaison and was responsible for the overall administration of the project.

EQE International, Inc. was the contractor for this project and Walter L. Frank and David K. Whittle were the principal authors of the text. The
authors relied significantly upon and wish to acknowledge the prior work,
thoughtful review, and support of co-workers David Jones, Steve Arendt,
Kevin Smith, Jack Vernon, and Charles Foshee.

CCPS also gratefully acknowledges the comments and the suggestions
submitted by the following peer reviewers:

Al W. Bickum, The Goodyear Tire & Rubber Company
Michael P. Broadribb, BP Amoco
Laurie J. Brown, Eastman Chemical Company
C. Curtis Clements, DuPont Company
John DiPalma, CYTEC Industries
Carol N. Garland, Eastman Chemical Company
Harry J. Glidden, DuPont Company
Dr. Martin Gluckstein, CCPS Staff
Rashid Hamsayeh, Formosa Plastics Corporation (USA)
Linda Hicks, Reilly Industries, Inc.
Russell Kahn, Novartis Corporation
Peter N. Lodal, Eastman Chemical Company
Lisa Morrison, Nova Chemicals
David J. Repasky, Sherwin Williams Company
Robert M. Rosen, BASF Corporation
Edward J. Ryczek, Merck & Company, Inc.
Adrian L. Sepeda, Occidental Chemical Corp.
Ronnie Tucker, PPG Industries, Inc.

Their insights, comments, and suggestions helped ensure a balanced
perspective for this Concept Series book.
Lastly, we wish to express our appreciation to Jack Weaver and Les
Wittenberg of the CCPS staff for their support and guidance.