2016 Annual Report

A Global Commitment Making an Impact

VISION20/20

The CCPS Story

JUST AFTER MIDNIGHT on December 3, 1984, water contamination of a tank of methyl isocyanate in Bhopal, India, initiated a series of events that led to a catastrophic toxic release, killing more than 3,000 residents and injuring over 100,000.

In February of 1985, industry leaders asked the American Institute of Chemical Engineers (AIChE®) to lead a collaborative effort to eliminate catastrophic process incidents. On March 23, 1985, AIChE formed the Center for Chemical Process Safety; CCPS completed Guidelines for Hazard Evaluation Procedures a short time later.

This year, as we mark the 30th anniversary of both Bhopal and CCPS, we pause to reflect on the progress we've made and recommit ourselves to Vision 20/20, the future of process safety.

Key milestones have included:

- Process safety as a management system
- Promoting the essential role of leadership and culture
- Developing the technical underpinnings of process safety in design
- Advancing the best practices in process hazard analysis
- Leading the establishment of global process safety metrics
- Forming the world's largest community with thousands of deeply connected process safety professionals
- And many more

We continue to honor the memories of the Bhopal dead by striving for a future where we can eliminate all process safety incidents. Toward this end, we remain committed to learning from incidents, advancing the practice, and collaborating broadly to implement. Vision 20/20, which serves as our roadmap. Come join the Global Community Committed to Process Safety — be ready for the future by helping to create it.

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Executive Director's Message

As we enter a new year, I remain very enthusiastic and optimistic about our ability — working together — to achieve the Center for Chemical Process Safety's vision of eliminating significant process safety incidents. Companies globally, whether small, medium or large, are expressing deep commitments to process safety and exhibiting increased interest in participating in the CCPS journey.

As I complete my first year as CCPS Executive Director, your many demonstrations of this shared spirit are especially significant and gratifying. I would like to offer my thanks to Scott Berger, the former CCPS Executive Director, for helping through the transition. I also offer thanks to the CCPS Staff for their inspiring dedication and support. And, of course, I especially thank all of you, the CCPS members and supporters who make our work possible.

As we reflect on the past year, it is clear that CCPS is making tremendous progress in strengthening the global commitment to improving process safety. The Global Congress on Process Safety Conference continues to be THE world-class event, bringing participants and best practices from many corners of the world. This year, CCPS also convened meetings in several new regions, with conferences in Australia, the Middle East, China and Malaysia, and Technical Steering Committee meetings and workshops throughout Asia, Europe, Latin America and the Middle East.

In celebration of CCPS' 30th anniversary, throughout 2015, CCPS members put a significant effort into two key initiatives. A dedicated team of CCPS volunteers, working with staff members, laid the foundation for the Process Safety Credentialing initiative that will launch globally in 2016. The Undergraduate Process Safety Education initiative to meet Accreditation Board for Engineering and Technology (ABET) requirements has also generated significant momentum. Both the Dow Chemical Company and Chevron Corporation have taken the lead in making multi-year commitments to help fund this crucial program. Many other companies are expressing strong interest in committing to multi-year support as well. This sustainable program will make it possible for all graduating BS chemical engineers, anywhere in the world, to be educated in the process safety basics necessary to a successful and SAFE chemical engineering career.

In 2015, the CCPS Vision 20/20 journey also gained significant momentum. Our Vision 20/20 Call to Action has been a key element of all of our meetings, conferences, and workshops, from the Global Congress in Texas last spring to the 2nd CCPS Global Summit in Kuala Lumpur this past November. Vision 20/20 is the platform on which all of our growth and efforts are based.

Although 2015 did bring some challenges, notably those in the energy markets, to us and our member companies, we relish the opportunities and successes cited above. Whatever the economic climate, together, given the strength of your commitment to Vision 20/20 and to process safety, we are certain to continue our progress toward zero process safety incidents.

Shakeel Kadri
CCPS Executive Director

Vision 20/20

By the year 2020, leaders in process safety will value and demonstrate actionable commitment to the Vision 20/20 tenets that prevent, minimize, and mitigate process safety incidents. Vision 20/20, developed by the Center for Chemical Process Safety (CCPS), looks into the not-too-distant future to demonstrate what great process safety will look like when it is championed by industry and driven by the Vision's five tenets and four global societal themes.

Five Tenets for Industry

At the heart of Vision 20/20 is adherence to five core principles that will help industry target and drive performance improvement and achieve process safety excellence:

- Committed Culture
- Vibrant Management Systems
- Disciplined Adherence to Standards
- Intentional Competency Development
- Enhanced Application of Lessons Learned

Four Societal Themes

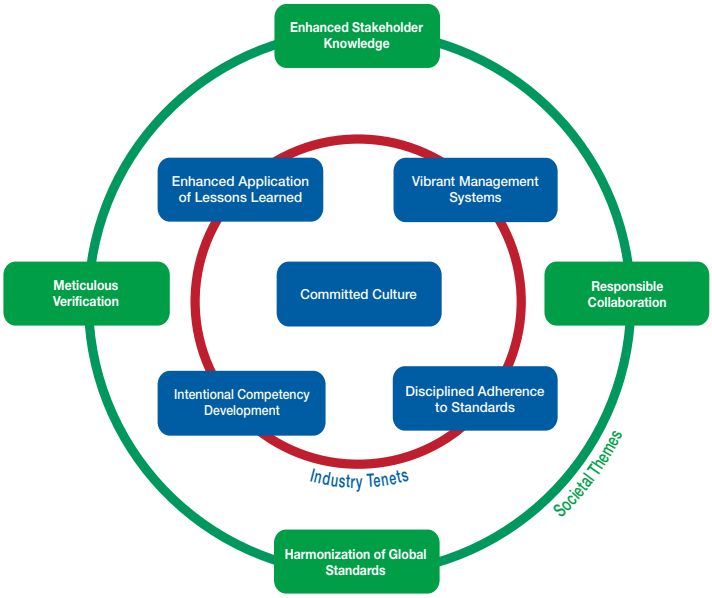
Vision 20/20 is a call to action for society, our leaders, governments, and the public at large to be fervent about protecting people and property. The Vision 20/20 bridge to that commitment is its four societal themes:

- Enhanced Stakeholder Knowledge
- Responsible Collaboration
- Harmonization of Standards
- Meticulous Verification

To Drive Improvement

As manufacturing and oil/gas production become more complex, the need to drive continuous improvement in process safety — not just for industry, but for all stakeholders — becomes increasingly urgent.

Vision 20/20 harnesses the collective expertise and best practices of CCPS to establish a global framework for excellent process safety, driven by industry tenets and global societal themes, that will achieve:



- Significant reduction of industrial and plant incidents
- Consistent overlap of corporate and plant employees, to ensure enhanced process safety understanding as well as rigorous adherence to standards and practices
- Persistent knowledge, cultural values, understanding, and implementation strategies, which will be utilized by executives, management, technicians, engineers, students, government, and the public
- A worldwide vision, guided by CCPS — a leader in state-of-the-art process safety solutions — for managing process safety improvements to fulfill Vision 20/20

The 20/20 Difference

What does great process safety look like? CCPS asked top executives to walk us through a typical day in the life of a CEO, a unit manager, and an academic, and then to imagine what that same day would look like if all industries were guided by Vision 20/20 tenets.

Visit www.aiche.org/ccps/about/vision-2020 to read more about the four societal themes and five tenets for industry, to envision a day in industry's not-too-distant future, and to see more of what industry leaders are saying about this important journey of process safety.

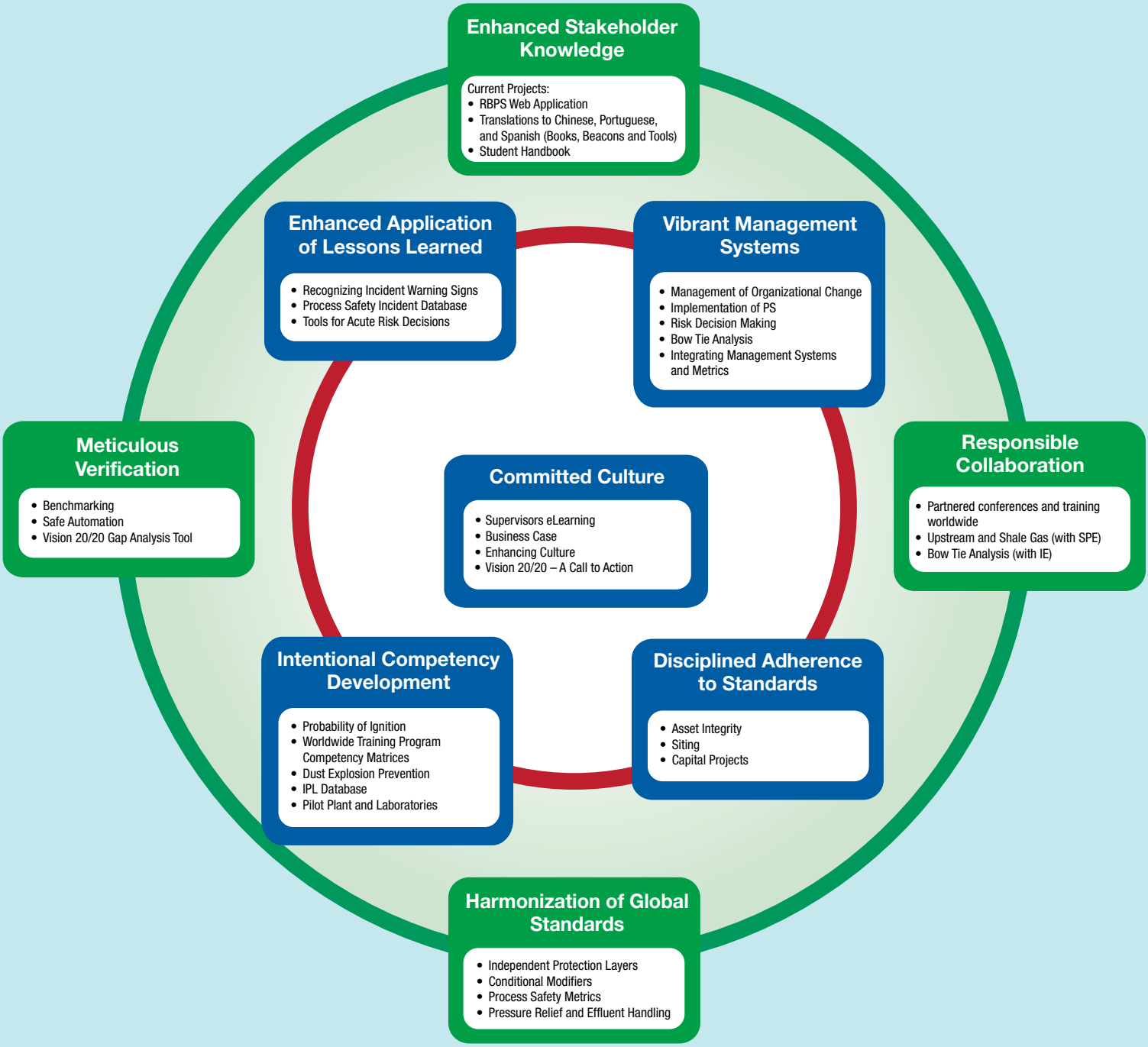
VISION 20/20

Implementing Vision 20/20...an Overview

Prepare	Assess	Plan	Perform	Achieve	Sustain
Present V20/20 to PSM Colleagues and Management	Complete the V20/20 Assessment Tool	Reinforce and Use Strong Elements as Building Blocks	Implement Action Plans	Complete Action Plans	Verify Management System Improvements
Make V20/20 a Regular Topic at PSM-Related Meetings	Identify Weak and Strong Sub-Elements (<2.5 or >3.5 Respectively)	Identify the Specific Improvements Needed	Monitor Status of Action Plan Implementation	Re-Assess V20/20 Implementation Status with the Assessment Tool	Develop Action Plans for Weak Sub-Elements and Individual Items
"Sprinkle" V20/20 into PSM Conversations	Report Results; Management Commits to Improve	Research Options to Improve (Reference Industry Documents)	Evaluate Effectiveness of Actions	Report & Celebrate Improvements	Implement Action Plans and Monitor Performance
Use V20/20 Logo on Internal Communications	Communicate Results Within Organization	Develop Specific Action Plans to Address Weak Areas	Capture & Communicate Learnings	Identify New Weak Sub-Elements and Weak Individual Items (<2)	Continual Improvement... Continue the Journey!

Today → 2020

CCPS 2016 Projects in Support of Vision 20/20



Get Your Company Involved

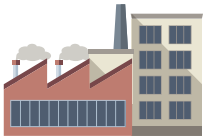
VOLUNTEER for a CCPS project subcommittee. Get the opportunity to share your knowledge and help shape industry best practices. You must be a CCPS member to volunteer for a project.
To volunteer, got to http://www.aiche.org/ccps/resources/forms/become-volunteer-ccps-projects.

EDUCATE your entire workforce by getting involved with the CCPS education curriculum which includes face-to-face Instructor-led training and eLearning courses.
To sign up for a course today go to http://www.aiche.org/ccps/resources/education.

SHARE your expertise by participating in the Global Congress on Process Safety (GCPS) or the CCPS Regional Conference. You can also participate in the CCPS Global or Regional TSC meetings.

- **To participate in conferences, go to: http://www.aiche.org/ccps/resources/conferences**
- **To participate in meetings, go to: http://www.aiche.org/ccps/resources/conferences/events**

MENTOR your new employees by bringing them to the Young Professionals program at the Global Congress on Process Safety.
For more information about the YP Community, go to http://www.aiche.org/community/sites/committees/young-professionals



MODEL your company as a process safety champion or a contractor for CCPS publications or tools.

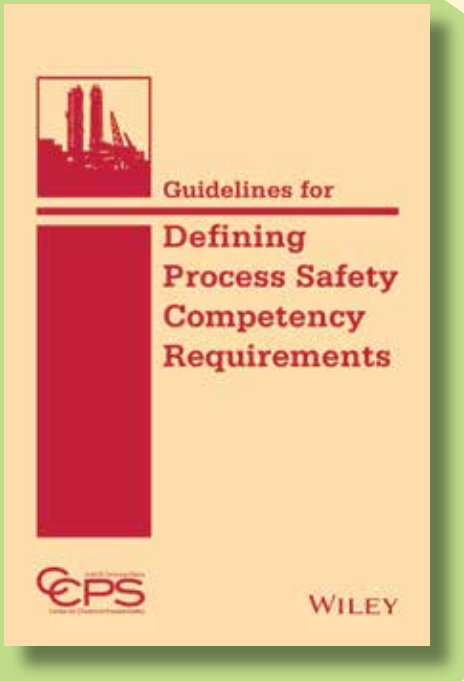
COMMUNICATE the message by forwarding CCPS' monthly business blast, Process Safety Beacon, to your colleagues.
Sign up for Beacon at http://www.aiche.org/ccps/resources/process-safety-beacon

CONNECT with your process safety peers through CCPS LinkedIn.
Join CCPS LinkedIn at http://www.aiche.org/ccps/community/overview

PARTICIPATE by helping your company get involved with CCPS' Vision 20/20 Responsible Collaboration activities throughout the year.
Contact Louisa Nara for more information at Louna@aiche.org

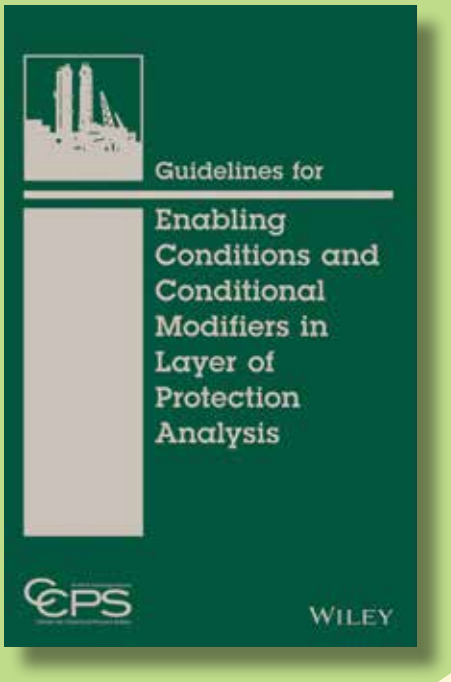
JOIN CCPS as a member company and prevent catastrophic process safety incidents.
Not a CCPS member yet? Join CCPS at http://www.aiche.org/ccps/community/membership.

Important CCPS News and Activities/Completed Book Projects



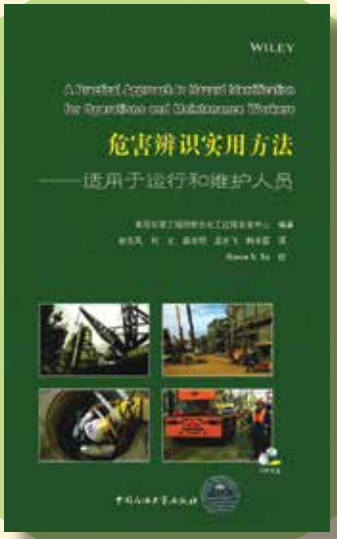
GUIDELINES FOR DEFINING PROCESS SAFETY COMPETENCY REQUIREMENTS

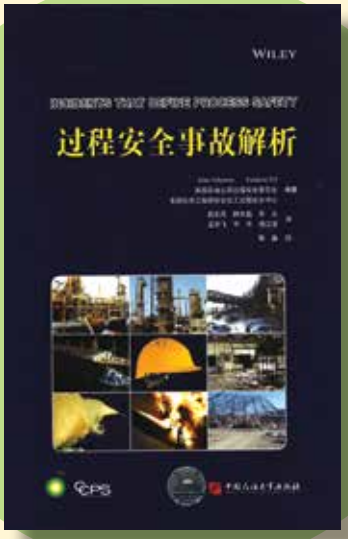
GUIDLINES FOR ENABLING CONDITIONS AND CONDITIONAL MODIFIERS IN LAYERS OF PROTECTION ANALYSIS



Important CCPS News and Activities/Completed Book Projects

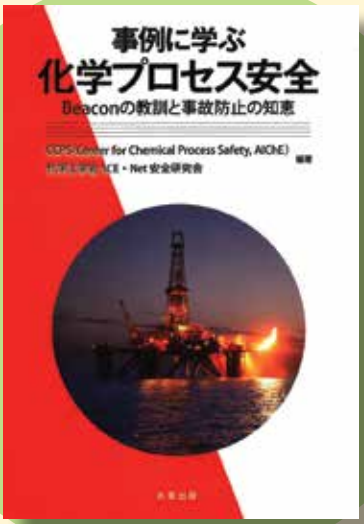
A PRACTICAL APPROACH TO HAZARD IDENTIFICATION FOR OPERATIONS AND MAINTENANCE WORKERS (CHINESE)





INCIDENTS THAT DEFINE PROCESS SAFETY (CHINESE)

PROCESS SAFETY BEACON ARCHIVE (JAPANESE)



Education

AIChE Academy

AIChE Academy
Connect | Learn | Solve

CCPS eLearning Courses Completed for 2016

- CCPS' Layer of Protection Analysis v2 (LOPA)
- CCPS' What Every New Engineer Needs to Know About Process Safety
- CCPS' OSHA Process Safety Management: Principles and Practice

CCPS SAChE Modules

AIChE Alliance
SAChE
Safety and Chemical Engineering Education

AIChE and CCPS recognize that the best way to improve safety in our plants and laboratories is through better process safety education. Although companies have extensive safety training programs, experience has shown that presenting process safety concepts as part of the chemical engineering curriculum proves most effective.

Through curriculum developed for students, professors, and young professionals, AIChE Academy and CCPS have teamed up to launch the following courses:

- Engineering Ethics and Professionalism ..... English
- Hazard Recognition ..... English
- Minimizing & Identifying Process Safety Hazards..... English
- An Introduction to Managing Process Safety Hazards ..... English
- Understanding Hazards & Risk English
- Hazard Recognition ..... Mandarin
- An Introduction to Managing Process Safety Hazards..... Mandarin
- Nitrogen's Role in Safety ..... Mandarin, ... Portuguese, ... Spanish
- Runaway Reactions ..... Spanish
- Basics of Laboratory Safety..... Spanish

CCPS Safety and Chemical Engineering Education – SAChE – Doing a World of Good

As part of AIChE's "Doing a World of Good" campaign, and in conjunction with the 30th anniversary of CCPS, industry and university leaders have come together on a major global initiative to improve and accelerate process safety education at the university level.

The ultimate goal is to have 100% of graduating bachelor-degree chemical engineers be trained and knowledgeable about process safety by passing the required SAChE certificates and demonstrating a certain level of training in process safety. While this is an ambitious goal to be implemented over time, integrating process safety education into AIChE's network of student members and global student chapters/universities will ultimately help shape the profession for decades to come.

The Undergraduate Process Safety Learning Initiative is a multi-pronged effort that will benefit companies, students, universities, and, ultimately, society, and concentrates on these three primary areas:

- Curriculum
- Faculty Competence
- Undergraduate Boot Camps

Student Boot Camp at New Mexico State University
Thanks to Dow's collaboration with AIChE, we held a very successful Boot Camp on March 31–April 1, 2015.

3rd Annual SAChE PSM Faculty Workshop held at Chevron Richmond Technology Center in Richmond, CA, August 8–12, 2015

2015 Events and Meetings

North America

The 11th Global Congress on Process Safety was held in Austin, Texas, April 26th–29th, 2015, was made up of over 1,000 attendees and 300-plus companies from over 40 countries.

11th GCPS Symposium and Track Chairs

GCPS Luncheon with over 500 attendees

The CCPS Spring Technical Steering Committee Meeting was held in Austin, Texas, and had over 100 attendees from more than 90 companies.

Spring TSC Group Photo

The CCPS Fall Technical Steering Committee Meeting was held in Houston, Texas, with over 70 attendees from more than 60 companies.

Fall TSC Meeting in Houston, Texas

The 2015 AIChE Gala, built around the theme "Leading the Way to a Safer World," was held on November 3rd, 2015. The Gala tied in with CCPS' 30th Anniversary. With over 350 guests in attendance, it raised more than $600,000 in support of the global expansion of process safety education for undergraduates.

AIChE Executive Director June C. Wispelwey

AIChE President Cheryl Teich & AIChE Executive Director June C. Wispelwey with honorees Mark Costa, Chairman & CEO, Eastman Chemical Company; Rex Tillerson, Chairman & CEO, ExxonMobil Chemical Company; and James Fitterling, Vice Chairman & CEO, The Dow Chemical Company

2015 Events and Meetings

South America

The 2nd CCPS Latin America Regional Meeting was held in São Paulo, Brazil, October 26th, 2015, with more than 40 attendees from 9 companies.

Europe

- The 3rd CCPS European Regional Meeting was held in The Hague, Netherlands, March 18th, 2015. This event was sponsored and held by the Association of the Dutch Chemical Industry (VNCI). The meeting had 25 attendees from 19 companies.
- CCPS and AIChE participated and exhibited in the ACHEMA 2015 Conference held in Frankfurt, Germany, June 15–19th, 2015.

CCPS Booth at ACHEMA 2015

AIChE Booth at ACHEMA 2015

The 4th CCPS European Regional Meeting was held in Reading, United Kingdom, September 17th, 2015. This event was sponsored and held by CCPS member Amec Foster Wheeler. The meeting had 25 attendees from 17 companies.

CCPS European Regional Meeting at Amec Foster Wheeler

The European Workshop on Process Safety was held in Nice, France, on September 28th–29th, 2015. Organized as a joint venture with CCPS and the Loss Prevention Working Party of the European Federation of Chemical Engineering, along with the valued involvement of the European Process Safety Center, the well-received workshop was conducted under the auspices of the 10th European Congress of Chemical Engineering. The workshop was joined by more than 50 attendees.

AIChE exhibited with support from CCPS at the 10th European Congress of Chemical Engineers Conference in Nice, France, September 27th–October 1st, 2015.

2015 Events and Meetings

Asia–Pacific

The 3rd CCPS China Conference on Process Safety, together with the China Chemical Safety Association and the National Center for International Cooperation in Work Safety, hosted the largest regional process safety conference to date in Ningbo, China, September 23rd–24th, 2015. Over 700 participants were in attendance.

3rd CCPS China Conference on Process Safety Keynote Session

Dr. Dongfeng Zhao, CCPS China Section Director, at the 3rd CCPS China Conference on Process Safety

The 1st CCPS China Technical Steerin Subcommittee Regional Meeting was held in Ningbo, China, September 25th, 2015. Supported by the China University of Petroleum, the Regional Meeting brought together more than 20 attendees from CCPS Member Companies.

1st CCPS China Regional Meeting, Ningbo, China

The 2015 AIChE CCPS Asia-Pacific Conference on Process Safety was held in Perth, Australia, February 9th–11th, 2015, with over 250 attendees.

2015 AIChE CCPS Asia-Pacific Conference on Process Safety, Perth, Australia

The 9th CCPS Asia-Pacific Regional Meeting was held in Singapore, September 17th, 2015, and was organized by CCPS member company PSRG Group. 40 attendees from within the Asia-Pacific region participated in the meeting.

The 2nd Global Summit on Process Safety was held in Kuala Lumpur, Malaysia, November 3rd–5th, 2015, with over 350 attendees from 75 companies and from 10 countries in attendance.

2nd Global Summit on Process Safety Chairs

Middle East and North Africa

The 1st CCPS Middle East Process Safety Conference was held in Abu Dhabi, UAE, May 19th–21st, 2015, with over 700 attendees from 100 organizations, along with 22 sponsors and exhibitors from industries including oil & gas, chemical and agrochemical.

MEPSC Technical Committee

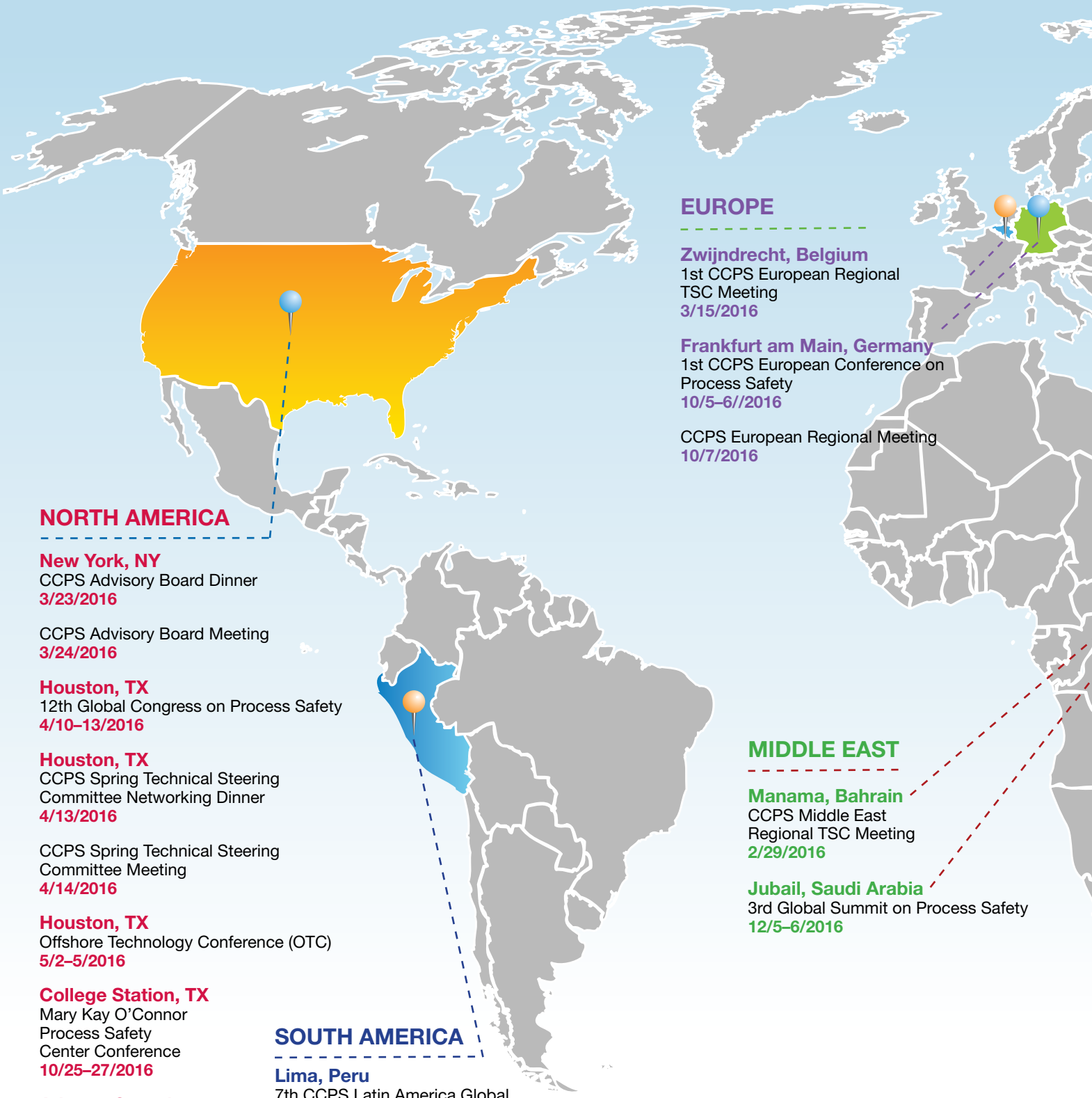
MEPSC Networking Coffee Break

AIChE Academy held two Public Boot Camps on CCPS' Foundations of Process Safety on June 8th–11th and again November 16th–19th in Manama, Bahrain.

November 16 –19, 2015, CCPS Foundations of Process Safety Course, Manama, Bahrain

June 8–11 2015, CCPS Foundations of Process Safety Course, Manama, Bahrain

CCPS 2016 Meetings, Destinations and Global Offices



NORTH AMERICA

New York, NY
CCPS Advisory Board Dinner
3/23/2016

CCPS Advisory Board Meeting
3/24/2016

Houston, TX
12th Global Congress on Process Safety
4/10–13/2016

Houston, TX
CCPS Spring Technical Steering Committee Networking Dinner
4/13/2016

CCPS Spring Technical Steering Committee Meeting
4/14/2016

Houston, TX
Offshore Technology Conference (OTC)
5/2–5/2016

College Station, TX
Mary Kay O'Connor Process Safety Center Conference
10/25–27/2016

Atlanta, Georgia
CCPS Fall Technical Steering Committee Meeting
11/9–10/2016

SOUTH AMERICA

Lima, Peru
7th CCPS Latin America Global Conference on Process Safety
8/22–23/2016

CCPS Latin America Technical Steering Subcommittee Regional Meeting
8/24/2016

EUROPE

Zwijndrecht, Belgium
1st CCPS European Regional TSC Meeting
3/15/2016

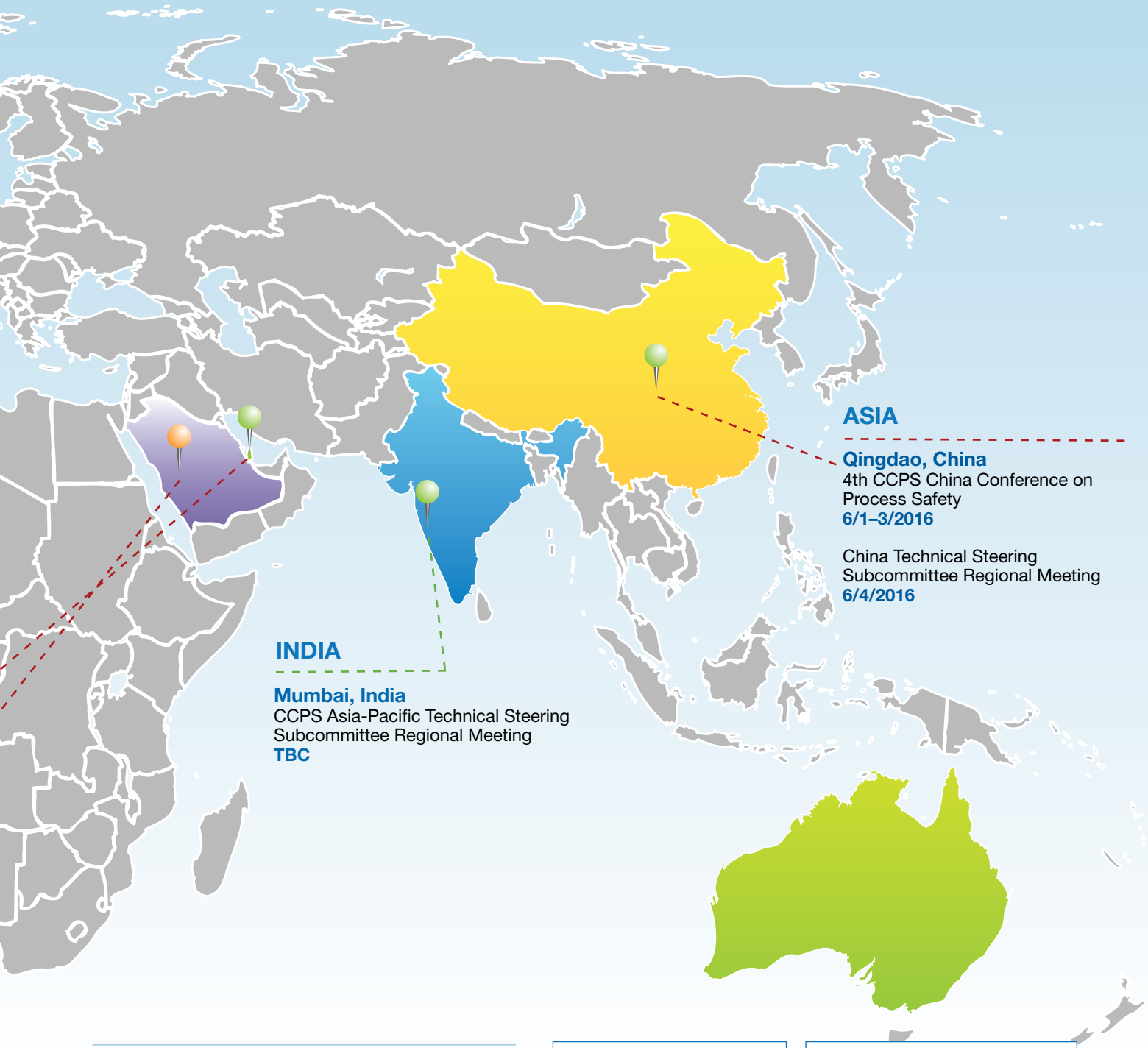
Frankfurt am Main, Germany
1st CCPS European Conference on Process Safety
10/5–6//2016

CCPS European Regional Meeting
10/7/2016

MIDDLE EAST

Manama, Bahrain
CCPS Middle East Regional TSC Meeting
2/29/2016

Jubail, Saudi Arabia
3rd Global Summit on Process Safety
12/5–6/2016



ASIA

Qingdao, China
4th CCPS China Conference on Process Safety
6/1–3/2016

China Technical Steering Subcommittee Regional Meeting
6/4/2016

INDIA

Mumbai, India
CCPS Asia-Pacific Technical Steering Subcommittee Regional Meeting
TBC

Look for the upcoming events on our website.

Dates are tentative. Visit www.ccpsonline.org for the most up-to-date information.

CCPS OFFICES

- New York, NY, U.S.
- Frankfurt, Germany
- Houston, TX, U.S.
- Mumbai, India
- Qingdao, China
- Singapore

Global Webconferences

TSC Winter Web Conference
2/2/2016

TSC Summer Web Conference
6/14/2016

TSC Fall Web Conference
9/20/2016

2016 Important Dates and Events

Event	Location	Date
TSC Winter Web Conference Call	CCPS Global Web Call	2/2/2016
CCPS Middle East Regional Meeting (TSC)	Manama, Bahrain	2/29/2016
CCPS European Regional Meeting (TSC)	Zwijndrecht, Belgium	3/15/2016
CCPS Advisory Board Dinner	New York, NY	3/23/2016
CCPS Advisory Board Meeting	New York, NY	3/24/2016
12th Global Congress on Process Safety	Houston, TX	4/10-13/2016
CCPS Spring Technical Steering Committee Networking Dinner	Houston, TX	4/13/2016
CCPS Spring Technical Steering Committee Meeting	Houston, TX	4/14/2016
Offshore Technology Conference (OTC)	Houston, TX	5/2–5/2016
4th CCPS China Conference on Process Safety	Qingdao, China	6/1-3/2016
CCPS China Technical Steering Sub-Committee Regional Meeting	Qingdao, China	6/4/2016
TSC Summer Web Conference Call	CCPS Global Web Call	6/14/2016
7th CCPS Latin America Global Conference on Process Safety	Lima, Peru	8/22-23/2016
CCPS Latin America Technical Steering Sub-Committee Regional Meeting	Lima, Peru	8/24/2016
TSC Fall Web Conference	CCPS Global Web Call	9/20/2016
1st CCPS European Conference on Process Safety	Frankfurt am Main, Germany	10/5-6/2016
CCPS European Regional Meeting	Frankfurt am Main, Germany	10/7/2016
Mary Kay O'Connor Process Safety Center Conference	College Station, TX	10/25-27/2016
CCPS Fall Technical Steering Committee Meeting	Atlanta, Georgia	11/9-10/2015
3rd Global Summit on Process Safety	Jubail, Saudi Arabia	12/5-6/2016
Middle East Industry Workshop	Kuwait	TBC
CCPS Asia-Pacific Technical Steering Sub-Committee Regional Meeting	Mumbai, India	TBC

Please look for our upcoming events on our website www.ccpsonline.org. Dates are tentive.

Organizational Structure

Technical Steering Committee (TSC)

The Technical Steering Committee (TSC) is the main body of CCPS, with one representative from each CCPS member company. The key functions of the TSC are to assist the CCPS director to:

- Develop an overall multi-year program for CCPS;
- Define priorities for project selection;
- Select specific projects for CCPS;
- Define and review scope for all projects;
- Suggest membership for the Project Subcommittees;
- Review status of all project programs.

The CCPS Technical Steering Committee meets in person two times a year and by web conference throughout the year.

Activities Management

Activities are monitored and directed by the:

- Managing Board
- Advisory Board
- Planning and Operations Committee
- Technical Steering Committee

Additionally, members of the Technical Steering Committee and other member company representatives serve on subcommittees that oversee CCPS projects. The Managing Board has fiduciary responsibility for CCPS' operations. The Advisory Board has strategic responsibility for CCPS. Board members review CCPS' mission and strategies and recommend new initiatives. The Planning and Operations Committee has responsibility for evaluating opportunities and gaps in CCPS programs relative to its strategy and generating potential. initiatives to address them

Managing Board

Chair – June C. Wispelwey, AIChE Executive Director

Shakeel Kadri, CCPS Executive Director

Gregory Stephanopoulos, AIChE President

Cheryl Teich, AIChE Past President

Bond Calloway, AIChE President Elect

Dennis Griffith, AIChE Treasurer

Freeman Self, AIChE Secretary

Tim Odi, AIChE Director

Dan Lambert, AIChE Director

Alan Nelson, AIChE Director

Organizational Structure

Advisory Board

Shakeel Kadri, CCPS, Chair

Laura Ambrose, The Dow Chemical Company

Per Bagge Angelo, Maersk Oil

Bob Bahr, ExxonMobil Chemical Company

Sulo Belawan, PETRONAS

Steve Burton, Total

Ana Davis, Syngenta Crop Protection, Inc.

Ray Gioventti, Occidental Chemical Corporation

Warren Greenfield, Ashland

Linda Hicks, Vertellus Specialties, Inc.

Cheryl Grounds, BP

Robert Kelley, Formosa Plastics Corporation

Matthew Koenings, DuPont Company

Craig Matthiessen, US EPA/OEM

Anne O'Neal, Chevron Energy Technology Company

Joe Pietrantonio, Air Products and Chemicals, Inc.

Michael Snyder, Dow Corning

Renato Prestes, Monsanto Company

Prasad Tipnis, Reliance Industries, Ltd.

Akio Ueda, Mitsubishi Chemical Corporation

Thomas Walsh, Honeywell, Inc.

June C. Wispelwey, AIChE

John Wnek, Evonik

Linda Zabel, 3m Company

Project Planning Committee

Pete Lodal, Eastman Chemical Company, Chair

Shakeel Kadri, CCPS Staff

Louisa A. Nara, CCPS Staff

Chris Aiken, Cargill

Kathy Anderson, Vertellus Specialties, Inc.

Anthony M. Downes, Honeywell, Inc.

Jerry Forest, Celanese Corporation

Jeffery Fox, Dow Corning Corporation

Eric Freiburger, Praxair, Inc,

Cheryl Grounds, BP

Neil Maxson, Covestro LLC

Jack McCavit, CCPS Emeritus

Américo Diniz Carvalho Neto, Braskem

Cathy Pincus, ExxonMobil Chemical Company

Jatin Shah, BakerRisk

Kevin Shaughnessy, The Dow Chemical Company

Karen Tancredi, Chevron Corporation

Scott Wallace, Olin Corporation

Projects and Volunteers

Guidelines for Barrier Risk Management (Bow Tie Analysis)

Kiran Krishna, Shell Downstream Manufacturing, Chair

Timothy McGrath, Chevron Corporation, Vice Chair

Charles Cowley, CCPS, Staff Consultant

Umesh Dhake, CCPS

Martin Johnson, BP

Mark Manton, ABS Consulting Group

Darrin Miletello, LyondellBasell

Louisa A. Nara, CCPS

Américo Neto, CCPS Emeritus

Sudhir Phakey, Linde Gas

Keith Serre, Nexen, Inc.

Ryan Supple, ConocoPhillips

T. V. Venkateswaran, Reliance Industries, Ltd.

Stephanie Wardle, Husky Energy

Robert Weber, PSRG

Vision 20/20

Cheryl Grounds, BP, Chair

Jack McCavit, CCPS, Staff Consultant

Louisa A. Nara, CCPS

Joe Allaben, Koch Industries, Inc.

Steve Arendt, ABS Consulting Group

Todd Aukerman, LanXess Corporation

Scott Berger, AcuTech Consulting Group Inc.

Michael Broadribb, BakerRisk

Jeff Fox, Dow Corning Corporation

Walt Frank, CCPS Emeritus

Dave Jones, Chevron Corporation

Pete Lodal, Eastman Chemical Company

Samantha Scruggs, BP

Karen Tancredi, Chevron Corporation

Rukyah Hennessey, CCPS

Facility Layout & Siting, 2nd Edition

Martin Timm, Praxair, Inc., Chair

Donald Connolley, BP, Vice Chair

Charles Cowley, CCPS, Staff Consultant

Susan Bailey, Linde Engineering North America, Inc.

Chris Buchwald, ExxonMobil Chemical Company

Bruce Bullough, Corden Pharma Colorado, Inc.

Andrew Carpenter, Exponent, Inc.

Andy Crerand, Shell Downstream Manufacturing

Christopher Devlin, Celanese Chemicals

Jonas Duarte, Chemtura

Randy Hawkins, AON Energy Risk Engineering

David Herrmann, DuPont Company

David Hill, Occidental Chemical Corporation

Casey Johnson, Covestro

Jayant Kulkarni, AON Energy Risk Engineering

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Guidelines for Process Safety in Upstream Oil and Gas and Shale Ops.

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Process Safety at a Glance

A Roadmap to CCPS Tools, Management Sysytems and Technical Resources

PROCESS SAFETY AT A GLANCE

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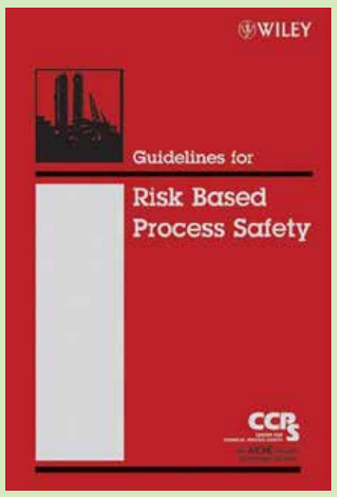
CCPS – Leading the Way to a Safer World Video at http://www.aiche.org/ccps/safety.

Find CCPS resources to meet your needs from the chart on this page. Additional information can be found at www.aiche.org/ccps.



It always makes sense to start with *Guidelines for Risk Based Process Safety*.*

When you're ready to learn more:

Find CCPS Management Resource Tools
Look up CCPS resources based on the 20 CCPS Elements of Risk Based Process Safety categories. Find the applicable elements from the center column and look left to find more detailed resources.

CCPS Technical Resource Tools
Look up CCPS resources for specific technical topics by searching the right-hand column for the topical area, then searching for a title within the area.

Most CCPS Books are Available at www.wiley.com/go/ccps.

Deep Search CCPS by searching for "CCPS" and keywords on Knovel.com.

CCPS Education
Tools and courses are available at http://www.aiche.org/ccps/resources/education.

Materials Translated
Mandarin, Japanese, Portuguese, Spanish and Italian available at http://www.aiche.org/ccps/Quick-Links.

* Available in Spanish, Japanese and Portuguese
** Available in Chinese

CCPS MANAGEMENT RESOURCE TOOLS

20 CCPS ELEMENTS OF PROCESS SAFETY

CCPS TECHNICAL RESOURCE TOOLS

GUIDELINES (G/L) FOR RISK BASED PROCESS SAFETY

COMMIT TO PROCESS SAFETY

- G/L for Implementing Process Safety Management Systems, 2nd Edition (2016)
- G/L for Process Safety in Outsourced Manufacturing Operations
- Local Emergency Planning Committee Guidebook: Understanding the EPA Risk Management Program Rule
- Inspiring Process Safety Leadership: The Executive Role (online and DVD)
- Process Safety Boot Camp - 2nd Generation
- Foundations of Process Safety for Offshore Operations
- Process Safety Culture Toolkit

Process Safety Culture
Standards, Codes, Regulations, and Laws
Process Safety Competency
Workforce Involvement
Stakeholder Outreach

UNDERSTAND HAZARDS AND RISKS

- G/L for Defining Process Safety Competency Requirements
- Introduction to Process Safety for Undergraduates and Engineers (2016)
- A Practical Approach to Hazard Identification**
- HAZOP eLearning
- LOPA eLearning
- Hazard Identification eLearning
- Hazard Identification for Operations and Maintenance Workers eLearning
- G/L for Chemical Process Quantitative Risk Analysis, 2nd Ed.
- G/L for Chemical Transportation Safety, Security, and Risk Management 2nd Ed.
- G/L for Developing Quantitative Safety Risk Criteria
- G/L for Hazard Evaluation Procedures, 3rd Ed.
- Layer of Protection Analysis**
- G/L for Enabling Conditions and Conditional Modifiers in Layer of Protection Analysis
- Guidelines for Initiating Events and Independent Protection Layers in Layer of Protection Analysis
- Recognizing Catastrophic Incident Warning Signs in the Process Industries

Process Knowledge Management
Hazard Identification and Risk Analysis

MANAGE RISK

- G/L for Integrating Management Systems and Metrics to Improve Process Performance
- Conduct of Operations and Operational Discipline
- G/L for Management of Change for Process Safety**
- G/L for Managing Process Safety Risks During Organizational Change
- G/L for Improving Plant Reliability Through Data Collection and Analysis
- Process Equipment Reliability Database
- G/L for Mechanical Integrity Systems
- G/L for Performing Effective Pre-Startup Safety Reviews**
- G/L for Process Safety Documentation
- G/L for Technical Planning for On-Site Emergencies
- Revalidating Process Hazard Analysis
- G/L for Analyzing and Managing the Security Vulnerabilities of Fixed Chemical Sites
- Process Safety for Front-Line Supervisors eLearning
- G/L for Writing Effective Operating and Maintenance Procedures

Operating Procedures
Safe Work Practices
Asset Integrity and Reliability
Contractor Management
Training and Performance Assurance
Management of Change
Operational Readiness
Conduct of Operations
Emergency Management

LEARN FROM EXPERIENCE

- Wisdom of Chemical Process Safety: Beacon Lessons and Accident Prevention (*Currently available in Japanese.)
- CCPS Process Safety Benchmarking Program
- CCPS Process Safety Metrics Online Reporting Application
- G/L for Process Safety Metrics
- Process Safety Leading and Lagging Metrics: "You Don't Improve What You Don't Measure"*/**
- Process Safety Leading Indicators Industry Survey
- G/L for Acquisition Evaluation and Post Merger Integration
- G/L for Auditing Process Safety Management Systems, 2nd Ed.
- G/L for Investigating Chemical Process Incidents, 2nd Ed.
- Incidents That Define Process Safety
- Process Safety Incident Database
- Tools for Making Acute Risk Decisions with Chemical Process Safety Applications
- Vision 20/20 Process Safety: The Journey Continues

Incident Investigation
Measurement and Metrics
Auditing
Management Review and Continuous Improvement

ELECTRONIC APPLICATIONS (PLANNED FOR 2016)

- CCPS Glossary
- CCPS Process Safety Incident Evaluation Tool
- NOAA Reactive Chemistry Worksheet Tool

VENTING AND EMERGENCY RELIEF

- Deflagration and Detonation Flame Arresters
- Emergency Relief Systems Design Using DIERS Technology
- G/L for Pressure Relief and Effluent Handling Systems
- Safe Design and Operation of Process Vents and Emission Control Systems

CHEMICAL REACTIVITY HAZARDS

- Chemical Reactivity Hazard Training CD-ROM
- Essential Practices for Managing Chemical Reactivity Hazards
- G/L for Process Safety in Batch Reaction Systems
- G/L for Reactivity Evaluation and Application to Process Design
- G/L for Safe Storage and Handling of Reactive Materials
- Reactivity Evaluation Software Tool

SAFE DESIGN

- Continuous Monitoring for Hazardous Material Releases
- G/L for Engineering Design for Process Safety, 2nd Ed.
- G/L for Fire Protection in Chemical, Petrochemical and Hydrocarbon Processing Facilities
- G/L for Safe Warehousing of Chemicals
- Inherently Safer Design, 2nd Ed.

CONSEQUENCE MODELING

- G/L for Consequence Analysis of Chemical Releases
- G/L for Evaluating Process Plant Buildings for External Explosions, Fires, and Toxic Releases, 2nd Ed.
- G/L for Vapor Cloud Explosion, Pressure Vessel Burst, BLEVE, and Flash Fire Hazards, 2nd Ed.
- Understanding Explosions
- Wind Flow and Vapor Cloud Dispersion at Industrial and Urban Sites
- G/L for Determining the Probability of Ignition of a Released Flammable Mass

BIOPROCESS SAFETY

- G/L for Process Safety in Bioprocess Manufacturing Facilities
- PSM Biodiesel eLearning
- PSM Bioethanol eLearning

DUST EXPLOSION HAZARDS

- G/L for Safe Handling of Powders and Bulk Solids

HUMAN FACTORS

- Human Factors: Methods for Improving Performance in the Process Industries
- G/L for Preventing Human Error in Process Safety

SAFETY INSTRUMENTED SYSTEMS

- G/L for Safe and Reliable Instrumented Protective Systems
- G/L for Safe Automation of Chemical Processes, 2nd Ed.

R&D

- Making EHS an Integral Part of Process Design

UPSTREAM

- G/L for Process Safety in Upstream and Shale Operations
- Most CCPS titles apply equally to upstream processes. (Please see appropriate RBPS element or technical topic.)