2017 Annual Report

EXPANDING
GLOBAL
AND REGIONAL
ENGAGEMENT
The CCPS Story

Just after midnight on December 3, 1984, water contamination of a methyl isocyanate tank 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.

As we enter into 2017, 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:

• CCPS Global Conference on Process Safety (Houston, Texas, USA)
• CCPS Global Summit on Process Safety (Dammam, KSA)
• Regional Technical Steering Committee Meetings in China, Peru, Germany, India and Brazil
• Expanded Global Outreach through training, speaking and working with partner organizations
• Enhanced Responsible Collaboration (CSB, OSHA, EPA, SOCMA, SPE, EI, ACS, UEF, API and others)
• CCPS Process Safety Beacon celebrated 15 years of continuous publication (180 issues)
• Reactive Chemistry Worksheet 4.0 created; home transferred from NOAA to CCPS website
• Electronic app for CCPS Glossary published
• Full program for CCPS Credentialing launched
• Five CCPS books published in the guidelines and concept series
• Outreach to students and professors improved through Boot Camp and SACHE

We continue to honor the memories of those lost in Bhopal 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 safety measures. Vision 20/20 serves as our roadmap. Come join the Global Community Committed to Process Safety—be ready for the future by working to create it.
Traveling around the world and meeting CCPS members, potential members and key stakeholders, we’re heartened by the ways in which CCPS’s message and influence continue to grow. During the past year, we had the pleasure of meeting with many of you, and we are so thankful for your engagement and support. One message received loud and clear is that CCPS needs to accelerate its global engagement. I would like to take this opportunity to recap our progress in this area.

The 12th Global Congress in Houston brought nearly 1000 diverse participants together to exchange best practices from many corners of the globe. The 4th China Conference, with nearly 300 delegates, was held in Qingdao in collaboration with China University of Petroleum/CCPS China Section. The 7th Latin America Process Safety Conference was held in Lima, Peru, with about 200 professionals from 60 companies. The 1st CCPS Conference on Process Safety and Big Data, in partnership with the European Process Safety Center, took place in Frankfurt, Germany, with more than 100 delegates from 62 companies enthusiastically exploring the power of big data analytics to improve process safety effectiveness. Last, we ended 2016 with the 3rd Global Summit on Process Safety, in Dammam, Kingdom of Saudi Arabia. With nearly 500 delegates, the conference highlighted the implementation of CCPS Vision 20/20. We held regional Technical Steering Committee (TSC) meetings in key regions, in addition to our usual face-to-face TSCs in the US.

CCPS saw good growth in global membership this year, welcoming 26 new members while unfortunately losing a few. We understand that lower oil prices have created economic challenges for several of our members, and therefore we have closely monitored market conditions and worked to assist CCPS Members facing those financial hurdles.

In 2016, CCPS made important progress on two key initiatives: Undergraduate Process Safety Education and Process Safety Professional Certification. The Undergraduate Process Safety Education Initiative will deliver 10 new interactive SAChE modules, with five new modules already translated into Spanish. We trained 92 educators in four faculty workshops hosted by Dow, ADM, Cargill and Chevron. Ninety-five knowledge-thirsty students attended three Process Safety Student Boot Camps as well. The CCPS Credentialing team launched the CCPS Process Safety Professional Certification program [CCPSC] this past spring. We completed two certification exam cycles, resulting in 92 CCPSC certificants.

Our journey toward CCPS Vision 20/20 continues, with a special emphasis this year on “responsible collaboration.” The Energy Institute and the Society of Petroleum Engineers joined us in new projects. We, in turn, supported the Synthetic Organic Chemical Manufacturing Association in responding to its members’ process safety needs. And our working relationship with the US Chemical Safety Board has become deeper and stronger than it has been in years.

On behalf of CCPS, I want to thank our 196 member companies for continuing to work together, tirelessly, to pursue our shared vision: protecting people, property and the environment by bringing the best process safety knowledge and practices to stakeholders around the world. Through collective wisdom, tools, training and expertise, we are sure to reach that goal.
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

Driving 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 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.
CCPS 2016 Projects in Support of Vision 20/20

Enhanced Stakeholder Knowledge
- Current Projects:
  - Process Safety Beacon
  - RBPS Web Application
  - Tool Translations to Chinese, Portuguese and Spanish (Books, Beacons and Tools)
  - Introduction to PS for Undergraduates and Engineers

Enhanced Application of Lessons Learned
- Recognizing Incident Warning Signs
- Process Safety Incident Database
- Tools for Acute Risk Decisions

Meticulous Verification
- Benchmarking
- Safe Automation
- Vision 20/20 Gap Analysis Tool

Vibrant Management Systems
- Management of Organizational Change
- Implementation of PS
- Risk Decision Making
- Bow Tie Analysis
- Integrating Management Systems and Metrics

Responsible Collaboration
- Partnered conferences and training worldwide
- Upstream and Shale Gas (with SPE)
- Bow Tie Analysis (with IE)

Intentional Competency Development
- Probability of Ignition
- Worldwide training program Competency Matrices
- Dust Explosion Prevention
- IPL Database
- Pilot Plant and Laboratories

Committed Culture
- Supervisor eLearning
- Business Case for Process Safety
- Enhancing Culture
- Vision 20/20—A Call to Action

Disciplined Adherence to Standards
- Asset Integrity Management
- Facility Layout and Siting
- Capital Projects

Harmonization of Global Standards
- Independent Protection Layers
- Conditional Modifiers
- Process Safety Metrics
- Pressure Relief and Effluent Handling

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- Vision 20/20—A Call to Action

- Asset Integrity Management
- Facility Layout and Siting
- Capital Projects

- Independent Protection Layers
- Conditional Modifiers
- Process Safety Metrics
- Pressure Relief and Effluent Handling
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, visit aiche.org/ccps/resources/forms/become-volunteer-ccps-projects (Note: You must be logged in as a CCPS member to volunteer for a project.)

Educate your entire workforce by getting involved with the CCPS education curriculum, with face-to-face instructor-led courses including Process Safety Boot Camp (CH 900), Foundations of Process Safety (CH 910), Incident Investigation (CH901), Recognizing Catastrophic Incident Warning Signs (CH850) and our many eLearning courses on process safety and related topics.

To learn more, visit aiche.org/ccps/resources/education.

Share your expertise by participating in the Global Congress on Process Safety (GCPS), a CCPS Regional Conference or a Global or Regional TSC meeting.

For conference information, visit aiche.org/ccps/resources/conferences. For meetings information, visit aiche.org/ccps/resources/conferences/events.

Mentor your new employees by bringing them to the Young Professionals program at the GCPS.

For information, visit aiche.org/community/sites/committees/young-professionals.

Model your company as a process safety champion for CCPS publications and tools.

For information, email ccps@aiche.org.

Communicate the message by forwarding CCPS’s monthly business blast, the “Process Safety Beacon,” to your colleagues.

Sign up for the Beacon at aiche.org/ccps/resources/process-safety-beacon.

Connect with your process safety peers through CCPS LinkedIn.

Join CCPS LinkedIn at ccpsonline.org.

Participate by getting your company involved in CCPS’s Vision 20/20 Responsible Collaboration activities throughout the year.

E-mail 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 aiche.org/ccps/community/membership.

Certify yourself now! Assure your company and colleagues that you are thoroughly versed in process safety. CCPS® Process Safety Professional Certification (CCPSC), based on a rigorous assessment process, verifies that your process safety knowledge is broad, deep and current. When you earn your CCPSC you show the world you have what it takes to be a CCPS Process Safety Professional.

Get certified at aiche.org/ccps/resources/certified-process-safety-professional.
Completed Book Projects

**Guidelines for Integrating Management Systems and Metrics to Improve Process Safety Performance**

This book combines the synergies between performance improvement systems to help ensure safe and reliable operations, streamline procedures and cross-system auditing, and support regulatory and corporate compliance requirements. Many metrics are common to more than one area, such that a well-designed and implemented integrated management system will reduce the load on the Process Safety, SHE, Security and Quality groups, and improve manufacturing efficiency and customer satisfaction. Systems to improve performance include: process safety, traditional safety, health and environment, and product quality.

**Introduction to Process Safety for Undergraduates and Engineers**

This book familiarizes the student or an engineer new to process safety with the concept of process safety management and serves as a comprehensive reference for Process Safety topics for student chemical engineers and newly graduated engineers. It can act as a reference material for a stand-alone process safety course or as a supplemental material for existing curricula. The book includes the evaluation of SACHE courses for application of process safety principles throughout the standard Ch.E. curricula in addition to, or as an alternative to, adding a new specific process safety course.
Guidelines for Implementing Process Safety Management

The second edition updates the first to include best practices for managing process safety developed by industry as well as incorporate the additional process safety elements. In addition, the book includes a focus on maintaining and improving a Process Safety Management (PSM) System. This edition also provides how-to information to determine process safety performance status, implement one or more new elements into an existing PSM system, maintain or improve an existing PSM system and manage future process safety performance.

Guidelines for Asset Integrity Management

This book is an update and expansion of topics covered in Guidelines for Mechanical Integrity Systems (2006). The new book is consistent with Risk-Based Process Safety and Life Cycle approaches and includes details on failure modes and mechanisms. Also, example testing and inspection programs for various types of equipment and systems are included. Guidance and examples are provided for selecting and maintaining critical safety systems.

Guidelines for Safe Automation of Chemical Processes

This book provides designers and operators of chemical process facilities with a general philosophy and approach to safe automation, including independent layers of safety. An expanded edition, this volume includes a revision of original concepts as well as chapters that address new topics such as the use of wireless automation and Safety Instrumented Systems. This book also provides an extensive bibliography to related publications and topic-specific information.
Education

AIChE Academy

CCPS eLearning Courses Launched in 2016
- The Importance of Codes and Standards for Process Safety
- Maintenance and Reliability for Chemical Engineers
- OSHA Process Safety Management Review
- What Every New Engineer Needs to Know about Process Safety
- Hazard Identification for Operators and Maintenance Workers—Spanish
- Process Safety Leadership for Front-Line Supervisors—Spanish

CCPS Safety and Chemical Engineering Education (SACChE)

AIChE and CCPS recognize that the best way to lead the way to a safer world is through better process safety education. Although most companies have extensive safety training programs, experience has shown that presenting process safety concepts earlier, as part of the undergraduate chemical engineering curriculum, proves most effective.

The Undergraduate Process Safety Learning Initiative

The Undergraduate Process Safety Learning Initiative is a multi-prong effort that will benefit companies, students, universities and ultimately society. The Initiative concentrates on three primary areas:
- Curriculum
- Faculty Competence
- Undergraduate Boot Camps

Rollout of the Undergraduate Process Safety Learning Initiative is well underway, and it is poised to meet and exceed goals in faculty and student participation, module development and industry and university awareness of the program on a global level.

A core initiative of AIChE’s Doing a World of Good campaign, the program incorporates process safety training into the chemical engineering curricula at universities throughout the world in order to ensure that every chemical engineering graduate has a working knowledge of process safety.

AIChE is collaborating with industry partners to introduce the Initiative to its 22,800 student members and over 50,000 global members through AIChE’s extensive communication channels, university outreach, membership publications, meetings and conferences.
Introducing the AIChE® Undergraduate Process Safety Learning Initiative.

Creating a safer, more livable world begins in the classroom.

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2016 Events and Meetings

North America

The 12th Global Congress on Process Safety, held in Houston, Texas, from April 10–13, 2016, drew over 1,000 process safety professionals and more than 300 companies from over 40 countries.

The CCPS Fall Technical Steering Committee Meeting was held from November 8–9, 2016, in Atlanta, Georgia, with over 60 attendees from more than 55 companies.

The CCPS Spring Technical Steering Committee Meeting was held on April 14, 2016, in Houston, Texas, and had over 140 attendees from more than 100 companies.

The 2016 AIChE Gala, built around the theme “Innovation,” was held on November 28, 2016. The Gala recognized companies and their leaders for distinguished achievements in innovation. Funds raised will support programs for chemical engineering students and professionals in entrepreneurship, innovation and creativity.

They will aid the international growth of the Institute’s Chem-E-Car Competition®, the “Futures” program for high-achieving young researchers and the development of a new program that fosters manufacturing innovation through modular chemical process intensification.
**South America**

The 7th CCPS Latin American Conference on Process Safety was held in Swissotel Lima, Peru, from August 21–22, 2016, with more than 200 attendees from 60 companies and 13 countries. Sponsored by Cargill, DuPont and PSRG, CCPS made a big impact at just the right time, with Peru soon implementing process safety regulations. The conference was preceded by a pre-conference workshop, “Incident Warning Signs,” which drew over 75 attendees.

The 3rd CCPS Latin America Regional Meeting was held in Rio de Janeiro, Brazil, on September 13, 2016, with more than 40 attendees.
Europe

The 1st CCPS Europe Regional TSC Meeting was held in Zwijndrecht, Belgium, on March 15, 2016. This meeting was sponsored and hosted by the 3M Company. The meeting had 30 attendees from 25 CCPS Member companies.

The 2016 European Conference on Process Safety and Big Data was held in Frankfurt am Main, Germany, from October 5–6. This conference was a joint event organized by CCPS and the European Process Safety Center (EPSC) with 108 attendees from more than 62 companies worldwide. Sponsors included TOTAL, Siemens, Orpic, Petrotechnics, Cefic, Rolls Royce and Sphera Solutions.

CCPS and AIChE participated and exhibited in the International Congress of Chemical and Process Engineering organized by the Czech Society of Chemical Engineering (CSCHE), in Prague, Czech Republic, from August 27–31.

The 5th CCPS European Regional Meeting was held in Frankfurt am Main, Germany, on October 7, 2016, sponsored by DECHEMA. The meeting had 14 attendees from 11 companies.

European Regional Meeting at DECHEMA House

AIChE/CCPS booth at the International Congress of Chemical and Process Engineering
Asia–Pacific

The 4th China Conference on Process Safety was hosted by AIChE, CCPS and the China University of Petroleum in Qingdao, China, from June 1–3. The conference drew more than 300 delegates worldwide, with representatives from government, academia and industry.

The 3rd Global Summit on Process Safety, with host sponsor SABIC, was held in Dammam, Saudi Arabia, from December 3–5, 2016, with nearly 500 attendees.

Middle East and North Africa

The 10th Asia Pacific Regional Meeting, sponsored by Reliance Industries Ltd., was held on October 14, 2016, in Mumbai, India, with more than 65 participants.

The 1st CCPS Technical Steering Committee Meeting was held on February 29, 2016, in Manama, Bahrain. The meeting was sponsored by the Gulf Petrochemical Industries Company and was attended by more than 15 participants.
CCPS 2017 Meetings, Destinations and Global Offices

EUROPE
Colombes, France
CCPS European Regional Meeting
3/16/17

Prague, Czech Republic
EUROCORR 20th International Corrosion Congress & Process Safety Congress 2017
9/5–9/6/17

Frankfurt am Main, Germany
Conference on Process Safety and Big Data
11/14–11/15/17

NORTH AMERICA
New York, NY
CCPS Advisory Board Dinner
3/8/17

CCPS Advisory Board Meeting
3/9/17

San Antonio, TX
13th Global Congress on Process Safety
3/26–3/29/17

CCPS Latin America Technical Steering Committee Regional Meeting
3/29/17

CCPS Technical Steering Committee Networking Dinner
3/29/17

CCPS Technical Steering Committee Meeting
3/30/17

Houston, TX
Offshore Technology Conference (OTC)
5/1–5/4/17

College Station, TX
Mary Kay O’Connor Process Safety Center Conference
10/24–10/26/17

Houston, TX
Fall Technical Steering Committee Meeting
11/8–11/9/17

SOUTH AMERICA
Rio de Janeiro, Brazil
CCPS Latin America Regional Meeting
3/9/17

San Antonio, TX
CCPS Latin America Technical Steering Committee Regional Meeting
3/26/17

Buenos Aires, Argentina
CCPS Regional Meeting
Q2 2017

Bogota, Colombia
Latin America Technical Steering Committee Regional Meeting
Q3 2017

Rio de Janeiro, Brazil
Offshore Technology Conference (OTC)
10/24–10/26/17

Lima, Peru
CCPS Latin America Regional Meeting
Q4 2017
Manama, Bahrain
2017 Middle East Process Safety Conference
10/9–10/11/17

Mumbai, India
CEO Conclave on Process Safety
TBC

Delhi, India
India Technical Steering Committee Meeting
3/2/17 TBC

Perth, Australia
Asia Pacific Regional Meeting
5/15/17

China TSC Web Call
China Technical Steering Committee Web Conference Call
2/23/17

Kuala Lumpur, Malaysia
Asia Pacific Technical Steering Committee Meeting
5/16/17

Nanjing, China
5th CCPS China Conference on Process Safety
9/20–9/22/17

2nd China Technical Steering Sub-Committee Regional Meeting
9/23/17

Okayama, Japan
4th CCPS Global Summit on Process Safety
9/12–9/13/17

For the latest information on upcoming events, please visit ccpsonline.org
## 2017 Important Dates and Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Location</th>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td>CEO Conclave on Process Safety</td>
<td>Mumbai, India</td>
<td>TBC</td>
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<tr>
<td>Technical Steering Committee Winter Web Conference Call</td>
<td>CCPS Global Web Conference</td>
<td>2/2/17</td>
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<td>Web Conference</td>
<td>China TSC Web Conference</td>
<td>2/23/17</td>
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<tr>
<td>Asia-Pacific Technical Steering Committee Meeting</td>
<td>Delhi, India</td>
<td>3/2/17 TBC</td>
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<td>China Technical Steering Committee CCPS Advisory Board Dinner</td>
<td>New York, NY</td>
<td>3/8/17</td>
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<td>CCPS Advisory Board Meeting</td>
<td>New York, NY</td>
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<td>CCPS Latin America Regional Meeting</td>
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<td>CCPS Europe Regional Meeting</td>
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<tr>
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<td>3/30/17</td>
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<td>Perth, Australia</td>
<td>5/15/17</td>
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<td>Kuala Lumpur, Malaysia</td>
<td>5/16/17</td>
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<td>Technical Steering Committee Summer Web Conference Call</td>
<td>CCPS Global Web Conference</td>
<td>6/15/17</td>
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<td>5th CCPS China Conference on Process Safety</td>
<td>Nanjing, China</td>
<td>9/20–9/22/17</td>
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<td>CCPS 2nd China Technical Steering Sub-Committee Regional Meeting</td>
<td>Nanjing, China</td>
<td>9/23/17</td>
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<td>Technical Steering Committee Fall Web Conference</td>
<td>CCPS Global Web Conference</td>
<td>9/27/17</td>
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<td>Lima, Peru</td>
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Organizational Structure

Technical Steering Committee (TSC)

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

- Developing an overall multi-year program for CCPS;
- Defining priorities for project selection;
- Selecting specific projects for CCPS;
- Defining and reviewing scope for these specific projects;
- Suggesting membership for the project subcommittees;
- Reviewing the status of all project programs.

The CCPS Technical Steering Committee meets face-to-face two times a year and by web conference throughout the year.

CCPS Activities Management

Activities are monitored and directed by the:

- CCPS Managing Board
- Advisory Board
- Project Planning 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’s operations. The Advisory Board has strategic responsibility for CCPS. Board members review CCPS’s mission and strategies and recommend new initiatives. The Planning and Operations Committee is responsible for evaluating opportunities and gaps in CCPS programs relative to its strategy and generating potential initiatives to address them.

Managing Board

June C. Wispelwey
AIChE Executive Director, Chair

Shakeel Kadri
CCPS Executive Director

Gregory Stephanopoulos
AIChE President

Cheryl Teich
AIChE Past President

Bond Calloway
AIChE President-Elect

Freeman Self
AIChE Secretary

Tim Odi
AIChE Director

Dan Lambert
AIChE Director

Alan Nelson
AIChE Director

Billy B. Bardin
AIChE Director
Projects and Volunteers

**Project 152 Process Safety Beacon**

John W. Herber  
CCPS Emeritus, Co-Chair

Rüdiger Lenz  
Celanese Corporation, Co-Chair

Dennis C. Hendershot  
CCPS Staff Consultant

Donald W. Abrahamson  
CCPS Staff Consultant

Katherine M. Anderson  
ioMosaic Corporation

Pedro A. Bonilla  
Buckman North America

Seshu Dharmavaram  
Dupont Company

Jeffrey L. Fox  
Dow Corning Corporation

David Guss  
Nexen, Inc.

Carolina Herrera  
BP

Kathy Kas  
The Dow Chemical Company

David A. Krabacher  
BASF Corporation

Michael W. Korst  
LyondellBasell

Antonio Lauzana  
Petrobras (retired)

Larry K. LeMesurier  
Syncrude Canada Ltd.

Marc E. Levin  
Washington State University

Georges A. Melhem  
ioMosaic Corporation

Jack L. McCavit  
CCPS Staff Consultants

Louisa A. Nara  
CCPS

Albert Ness  
CCPS

William M. Olsen  
Merck & Company, Inc.

Yasser A. Rahim  
Gulf Petrochemical Industries Company

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PPG, retired

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Jatin N. Shah  
BakerRisk

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John C. Stoney  
BP Corp North America

Tom Spicer  
University of Arkansas

Anthony A. Thompson  
Monsanto Company (retired)

John C. Wincek  
Croda, Inc.

Jan Windhorst  
Emeritus

**Project 233 Key Performance Indicators for Risk-Based Process Safety (Process Safety metrics)**

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Elroy M. Christie  
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Sean Dee  
Exponent, Inc.

Nancy Faulk  
Siemens Energy

Jeffrey L. Fox  
Dow Corning Corporation

R. Wayne Garland  
Eastman Chemical Company

Andrew Goddard  
Arkema, Inc.

Gil Guillory  
Burns and McDonnell

Mahendran Guru  
Orpic

Scott Allen Haney  
Marathon Petroleum Company

Astor Harris  
Petrotrin

Michell LaFond  
Dow Corning Corporation

Sue Lee-Martin  
Arkema, Inc.

Darrell Loewe  
Formosa Plastics Corporation

Steven R. Marwitz  
Formosa Plastics Corporation

Louisa A. Nara  
CCPS

Mark Paradies  
System Improvements, Inc.

*continued on page 22*
Cesar Puma
Pluspetrol

Marcela Recaman
Equión Energía Ltd.

Sonny Sachdeva
PSRG

Dan Sorin
Nova Chemicals Corporation

Scott Wallace
Olin Corporation

Dan Wilczynski
Marathon Petroleum Company

Rukyah Hennessey
CCPS

**Project 237 Guidelines for Barrier Risk Management (Bow Tie Analysis)**

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Shell Downstream Manufacturing, Chair

Charles Cowley
CCPS Staff Consultant

Umesh Dhake
CCPS

Zsuzsanna Gyenes
EC JRC MAHB

Joanne Hill
Risktec Solutions, Inc.

Martin Johnson
BP Corp North America

Mark Richard Stening Manton
ABS Consulting

Darrin J. Miletello
LyondellBasell

Louisa A. Nara
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Tullow Oil

Dennis Evers
Centrica

Peter Jeffries
Phillips66

Rob Miles
Hu-Tech

Rob Saunders
Shell Downstream Manufacturing

Mark Scanlon
Energy Institute

Don Smith
Eni

**Project 241 Guidelines for Safe Automation, 2nd Edition**

R. Wayne Garland
Eastman Chemical Company, Chair

Daniel E. Silva
CCPS Staff Consultant

Mohammed Rehan Baig
Bayer CropScience

Troy F. Bennett
ExxonMobil

William G. Bridges
Process Improvement Institute, Inc.

Michael P. Broadribb
BakerRisk

Michael Boyd
Husky Energy

John R. Campbell
ConocoPhillips

John D. Day
Air Products & Chemicals, Inc.

David A. Deibert
Air Products & Chemicals, Inc.

Rick Dunn
Dupont Company

William S. Fink
Sage Environmental, Inc.

Andrew Goddard
Arkema, Inc.

Bill Hearn
SIS-Tech Solutions

Kevin L. Klein
Celanese Chemicals

Suhas Kulkarni
Toyo Engineering India, Ltd.

Len Laskowski
Emerson Process Management
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<td>Gregory G. Weidner</td>
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**Project 246 Guidelines for Siting and Layout of Facilities, 2nd Edition**

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<td>Rukyah Hennessey</td>
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<td>Manuel Herce</td>
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<td>Florine Williams Vincik</td>
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**Project 244 Process Safety–Vision 2020**

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</table>
### Project 248 Tools for Making Acute Risk Decisions

Fred Henselwood  
NOVA Chemicals Corporation, Co-Chair

Jeffrey C. Stawicki  
The Lubrizol Corporation, Co-Chair

Dave Belonger  
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Derek Miller  
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Akzonobel

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### Project 249 Essential Practices for Developing, Strengthening and Implementing Process Safety Culture

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iomosiac, Chair
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Michigan Technological University
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Project 255 Evergreen LOPA/IPL Database

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Art Dowell
Process Improvement Institute, Inc.
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Project 268 Dealing with Aging Process Facilities and Infrastructure

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Sudhir Kumar Phakey
Linde Gas
Tom Sandbrook
The Chemours Company
Jatin N. Shah
BakerRisk

continued on page 26
PROJECTS AND VOLUNTEERS

continued from page 25

Kenneth E. Tague
Archer Daniels Midland Company

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Terry White
Pacific Gas and Electric Company

Project 269 Preventing Normalization of Deviation

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Manuel Alberto Rodriguez
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Tony Strawhun
NewMarket

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Archer Daniels Midland Company

Karen Tancredi
Chevron Corporation

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Croda, Inc.

Elliot M. Wolf
Syngenta

Project 270 Guidelines for Process Safety in Upstream Oil, Gas and Shale Ops

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Chemtura Corporation

Sergio Luiz Guedes
Petrobras

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Contek Solutions LLC

Graeme Leggett
BP Corp North America

David R. Mohler
Honeywell, Inc.

Jason W. Nicholls
ExxonMobil

Richard Piette
Suncor Energy

Kevin D. Watson
Chevron Corporation

Robert J. Weber
PSRG

Project 271 Process Safety Applications for Electronic Devices (Smart Phones/Tablets/Desktop, etc.)

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Celanese Chemicals, Chair

Daniel Silva
CCPS Staff Consultants

Rukyah Hennessey
CCPS

Christopher Keller
BASF

Nguyen Trung Kiet
Binh Son Refining & Petrochemical Co., Ltd (BSR)

Dave Moore
AcuTech Consulting Group, Inc.
**Project 275 Process Safety During Transient Operations (Start-up/Shutdown)**

**Theresa Lynne Broussard**  
Chevron Corporation, Chair

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CCPS Staff Consultant

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**Eddie G. Dalton**  
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**Astor W. Harris**  
PETROTRIN

**Jitesh Patel**  
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**Pamela M. Nelson**  
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**Scott Schiller**  
BakerRisk

**Mario Enji Yamaguchi Sumida**  
BASF Corporation

**Robert J. Weber**  
PSRG, Inc.

**Eliot M. Wolf**  
Syngenta

**Project 277 Guidelines for Inherently Safer Design**

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**Pam Feldman**  
Chevron Corporation

**Kevin He**  
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**Jerry Keezer**  
Arkema

**Dan Miller**  
BASF Corporation (retired)

**Mikelle C. Moore**  
Buckman North America

**Mike Neill**  
Petrotechnics USA, Ltd.

**Jitesh Patel**  
DEP NJ

**Robert J. Weber**  
PSRG, Inc.

**Carlos Wigstrom**  
Pluspetrol S.A.

**Dan Wilczynski**  
Marathon Petroleum Company

**Project 276 Guidelines/Essentials of Safe Work Practices/Conduct of Operations**

**David Lewis**  
Occidental Chemical Corporation, Chair

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**Katherine M. Anderson**  
ioMosaic Corporation

**Steve Arendt**  
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**Project 278 Risk-Based Process Safety Web Application Tool**

**Andrew P. Hart**  
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**Dennis Hendershot**  
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Americas Styrenics

**Jitesh Patel**  
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**Leisa Porter**  
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**Morgan Reed**  
MMI Engineering

**Sabrina Putruele**  
Pluspetrol S.A.

**Sonny Sachdeva**  
PSRG, Inc.

**Randy Sawyer**  
Contra Costa Health Services

**Scott Wallace**  
Olin Corporation

**Robert J. Weber**  
PSRG, Inc.

**Project 278 Risk-Based Process Safety Web Application Tool**

**Karen Tancredi**  
Chevron Corporation, Co-Chair

**Tony M. Downes**  
Honeywell, Inc., Co-Chair

**Jing Chen**  
CCPS
PROJECTS AND VOLUNTEERS

Project 279 Incidents That Define Process Safety, Volume II

David Prior
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Jerry Forest
Celanese Chemicals

Derek Miller
Air Products & Chemicals, Inc.

Karen Tancredi
Chevron Corporation

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Executive Director

Orlando Acosta
Latin American Regional Manager

Lamese Bader
Membership & Communications Manager

Jing Chen
Engineering Specialist

Umesh Dhake
Asia Pacific Regional Manager

Rukyah Hennessey
Engineering Specialist

Angela Louis
Projects Coordinator

Horst Massong
European Regional Manager

Louisa Nara
Technical Director

Shami Nayak
Asia-Pacific Business Development Manager

CCPS China Section

Professor Zhao Dongfeng
Director China Section

Dr. Yi Lie
Assistant Director China Section

CCPS Staff Consultants and Instructors

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Jim Conner

Charles Cowley

Steve Eason

Walt Frank

Warren Greenfield

Dennis Hendershot

John Herber

Jerry L. Jones

Brian Kelly

Jack McCavit

Dan Miller

John Murphy

Bob Rosen

Adrian L. Sepeda

Daniel E. Sliva

Nestor Sposito

Byron Sun
Moving On

Albert Ness joined CCPS in 2013 as a Process Safety Writer and subsequently took on the Senior Process Safety Specialist role. He has been influential in the technical writing and publishing of a number of CCPS books over the past four years, most recently the Guidelines for Pressure Relief and Effluent Handling Systems, 2nd ed. and Guidelines for Combustible Dust Hazard Analysis. Al retired at the end of 2016, but will return to CCPS in 2017 as a staff consultant.

Rich Sarnie joined CCPS in 2015 as the CCPS Projects Director and took on additional oversight roles in DIERS and DIPPR. Rich made important contributions in the completion of the CCPS Credentialing Program (CCPSC) and worked to increase the number of faculty workshops offered. He was involved in responsible collaboration with other organizations by giving presentations on process safety for non-chemical manufacturing.

CCPS thanks both individuals for their service to CCPS and AIChE over the past several years and wishes them good luck in their future endeavors.
## 2016 Worldwide CCPS Members

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<td>Chevron Corporation</td>
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<td>Chevron Phillips Chemical Company LP</td>
<td>LyondellBasell</td>
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<td>Chilworth Technology, Inc.</td>
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<td>Mallinckrodt Pharmaceuticals</td>
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<td>Map Ta Phut Tank Terminal</td>
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<td>MISTRAS Group, Inc.</td>
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<td>Coogee Chemicals Pty. Ltd.</td>
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<td>Corden Pharma Colorado, Inc.</td>
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<td>The Mosaic Company</td>
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<td>Croda, Inc.</td>
<td>National Grid</td>
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<td>DASSIS Corp.</td>
<td>New Crest Mining Company</td>
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<tr>
<td>Deccan Fine Chemicals India Pvt. Ltd.</td>
<td>New Jersey Dept. of Environmental Protection</td>
</tr>
</tbody>
</table>

**Contact Information:**

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NY (home office), Frankfurt, Houston, Mumbai, Qingdao and Singapore
Tel: (+1) 646.495.1371 | E-mail: ccps@aiche.org | ccpsonline.org
## CCPS MANAGEMENT RESOURCE TOOLS

**COMMIT TO PROCESS SAFETY**
- 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

**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 Operators 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

**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
- Relying on 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

**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

## CCPS TECHNICAL RESOURCE TOOLS

**PROCESS SAFETY AT A GLANCE**

- Process Safety Culture Standards, Codes, Regulations and Laws
- Process Safety Competency Workforce Involvement Stakeholder Outreach
- Process Knowledge Management Hazard Identification and Risk Analysis

**20 CCPS ELEMENTS OF PROCESS SAFETY**

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

**VENTING AND EMERGENCY RELIEF**
- Delegation 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 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.)

**ADDITIONAL RESOURCES**

- View the CCPS Video “Leading the Way to a Safer World” at aiche.org/ccps/safety
- Find CCPS resources to meet your needs from the chart on this page. Additional information can be found at aiche.org/ccps
- It always makes sense to start with Guidelines for Risk Based Process Safety.*
- 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 wiley.com/go/ccps.
- Deep Search CCPS by searching for “CCPS” and keywords on Knowmulti.com.
- CCPS Education
- Tools and courses are available at aiche.org/ccps/resources/education.
-Translated Materials
- Mandarin, Japanese, Portuguese, Spanish and Italian versions available at aiche.org/ccps/QuickLinks.

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