9th Annual CCPS Canadian Regional Meeting

Meeting Hosted by Ovintiv

Tuesday September 10, 2024, at 08:30-16:45 (MT)

Time	Subject	Speaker
08:30	**Check-in**	
09:00	Opening	Anil Gokhale (CCPS) Fred Henselwood (NOVA Chemicals)
09:05	Welcome Comments	Kim Williams (Ovintiv)
09:20	Safety Moment	Katie Bramhall (Parkland Refining)
09:35	Mind the Gap: Bridging Asset Integrity and Process Safety, through a Digital Transformation Era	Raül Adell (Kent)
10:00	PSM in CSA Standards	Adrian Pierorazio (Jensen Hughes)
10:15	**Break**	
10:45	CSChE Process Safety Management Division Activities and Collaboration Opportunities	Lianne Lefsrud (CSChE PSMD)
10:55	Energy Safety Canada Process Safety Update Grounding and Bonding Video	Robert Waterhouse, Abbey Adeogun, Glen Worobets (Energy Safety Canada)
11:10	Natural Language Processing for analyzing inspections vs. incidents to find missing leading indicators	Reza Bahrami (UofA)
11:25	CCPS Update	Michele Horwitz Anil Gokhale (CCPS)
11:55	CCPS Project Voting and Idea Generation	Fred Henselwood (CCPS Planning Board)
12:00	**Lunch**	
13:00	My Career in CO2 and Related Pipelines	Bill Timbers (Timbers Consulting)
13:25	Carbon Capture Sequestration Opportunities and Risks	Eric Stubbs (AON)
13:50	The Skills gap in Canadian Manufacturing	Nathan Phillips (Voovio)
14:15	**Break**	
14:45	Risk-based Approach for Safe Terminal Operation and Route Planning for On-Road Hydrogen Distribution	Anirudha Joshi (UofA)
15:00	Panel on Safety Critical Equipment Glen Worobets (Moderator)	Brad Gushlak (Ovintiv) Tenny Thomas (Suncor) Dharmesh Dalwadi (TC Energy) Hermawati Ernie Charmadi (PETRONAS Canada)
15:50	Combustible Dust	Cathleen Lupien (Jensen Hughes)
16:05	Creating an “Early Warning System” dashboard of precursory conditions	Hamid Golabchi (UofA)
16:20	Open Sharing and Session Feedback	Anil Gokhale (CCPS)
16:45	Closing Comments	Fred Henselwood (NOVA Chemicals)

Consulting

Mind the Gap: Bridging Asset Integrity and Process Safety, through a Digital Transformation Era

9th Annual CCPS Canadian Regional Meeting

Raül P. Adell Colomer, Calgary, AB

2024-09-10

kent

My Profile

- **C**hemEng + ProcEng + AT3P
- **E**NI (E&P Intl)
  - IOGP Rep – RADD 2010 Rev.
  - KPO & IOGP
- **R**GU-ABS (MSc HS&RM)
  - IOGP & HRO
- **O**MV (E&P/Energies)
  - IOGP Rep – PSSC HFSC
- **K**ent (CA E&C)

Audience's Interests

- Control of MAJOR Accident Hazards, OR…

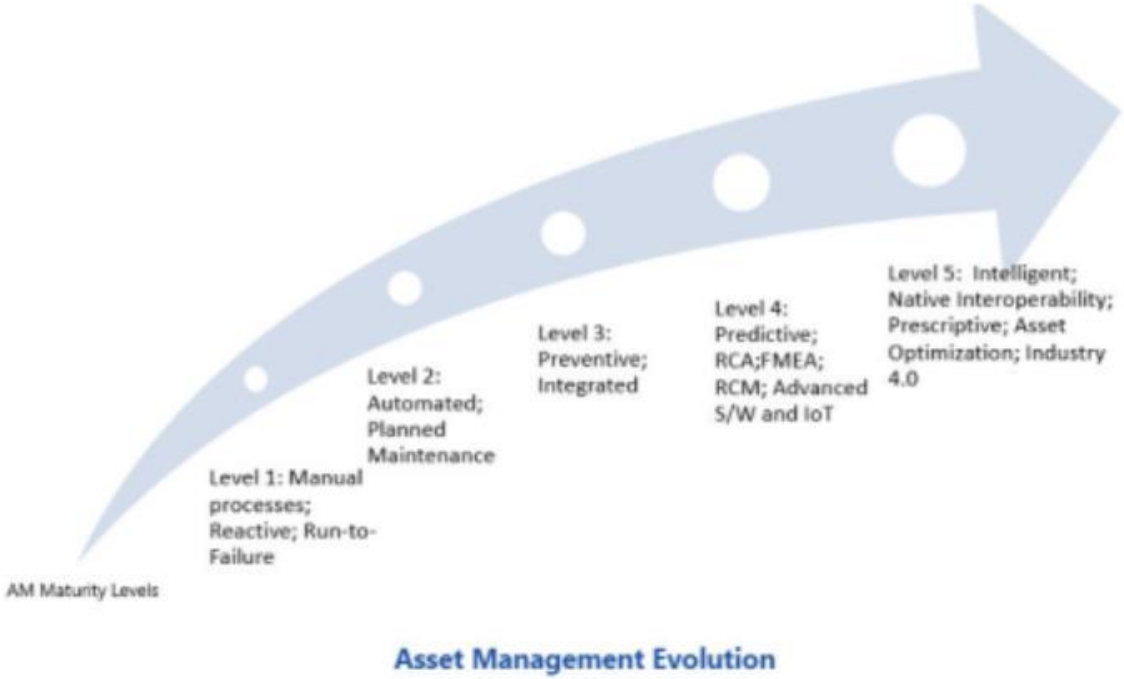
ToC

- **Intro**
  - APM
  - IOGP PSF
  - PSM KPIs
- APM **Negative Effects** on PSM
- PSM Pro's **Role** on APM Negative Effects
- PSM's **Fight** on APM negative effects
- PSM Pro's **Success** on APM Negative Effects

Intro

- APM
  - Predictive Maintenance
  - Prescriptive Maintenance

Inderpreet Shoker - ARC View White Paper - Taking Predictive Maintenance to Next Level - 2023-05-4_2024-09-06



Intro

- IOG PSF

Intro

- PSM KPIs: API 754 / IOGP 456
  - Non-LOPC Tier 3
  - Tier 4

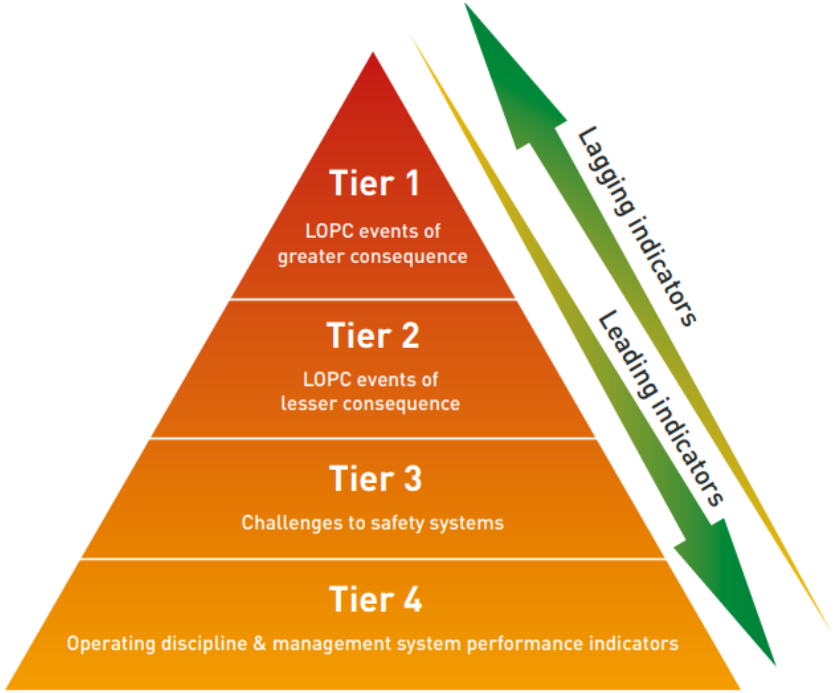
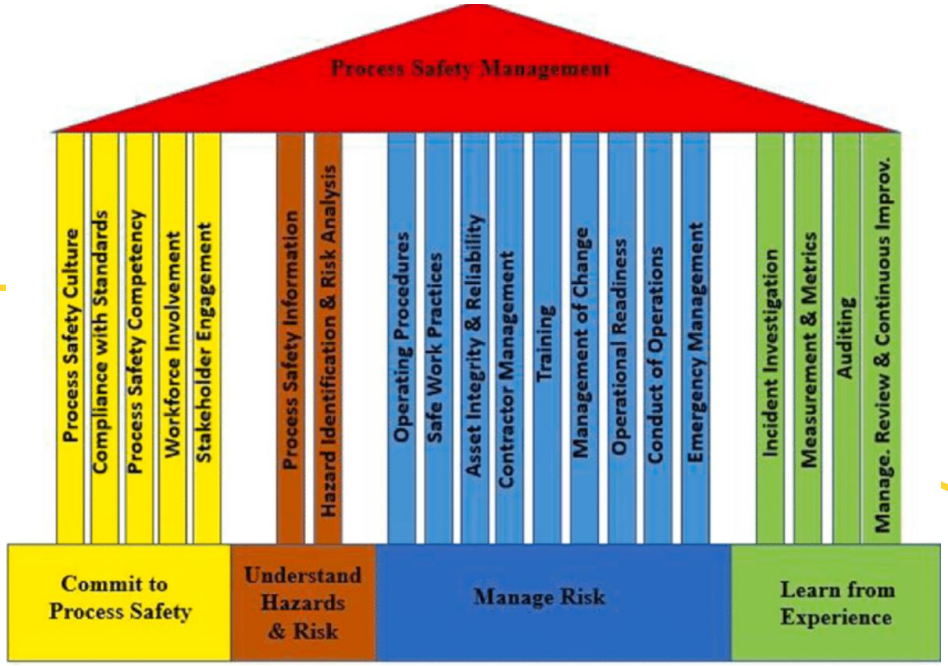


Figure A.1: Process safety indicator pyramid: the triangle emphasises that larger data sets are available from the KPIs at the lower tiers.

APM Negative Effects on PSM

- PS Performance
- Risk Perception
- PSMS & Core Processes (e.g. CCPS RBPS Pillars & Elements)
  - —Risk Management
  - —Continuous Improvement



APM Negative Effects on PSM

- HELP? IOGP Digital Transformation Committee?

Prescriptive Maintenance
(outer layer of Road Map – Q1 2023 sneak peek)

PSM Pro's Role on APM Negative Effects

COMPENSATE High Asset Performance with High Human Performance

- APM Transformation → COMPLACENCY, focus on Asset (Plant & Process)
  - —WHAT and WHERE to expect change? (People? MIT?)
- APM Learning Experience
  - —WHO and HOW to learn?
  - —From Human Causation to Machine Correlation
- APM as LoP
  - —LoP Management & Governance → TA Framework?
- APM-mature/ready facilities?

PSM’s fight on APM negative effects

- Context Analysis: Current & Future
- PSMS Processes Baseline (and Benchmark?)
- Engagement with Digital Transformation Governance from Strategic to Operational Levels
- HELP?

PSM's Fight on APM negative effects

- HELP?
  - Legal Framework?
  - Due Diligence?
  - Process Safety Fundamentals within O&HMS?
    - IOGP
    - EPSC

PSM Pro’s Success on APM Negative Effects

- **Measure progress on a Mindful Transformation (all levels)**
  - Workforce engagement
  - PSM Competence improvement
  - Successful APM adoption

kent

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JENSEN HUGHES

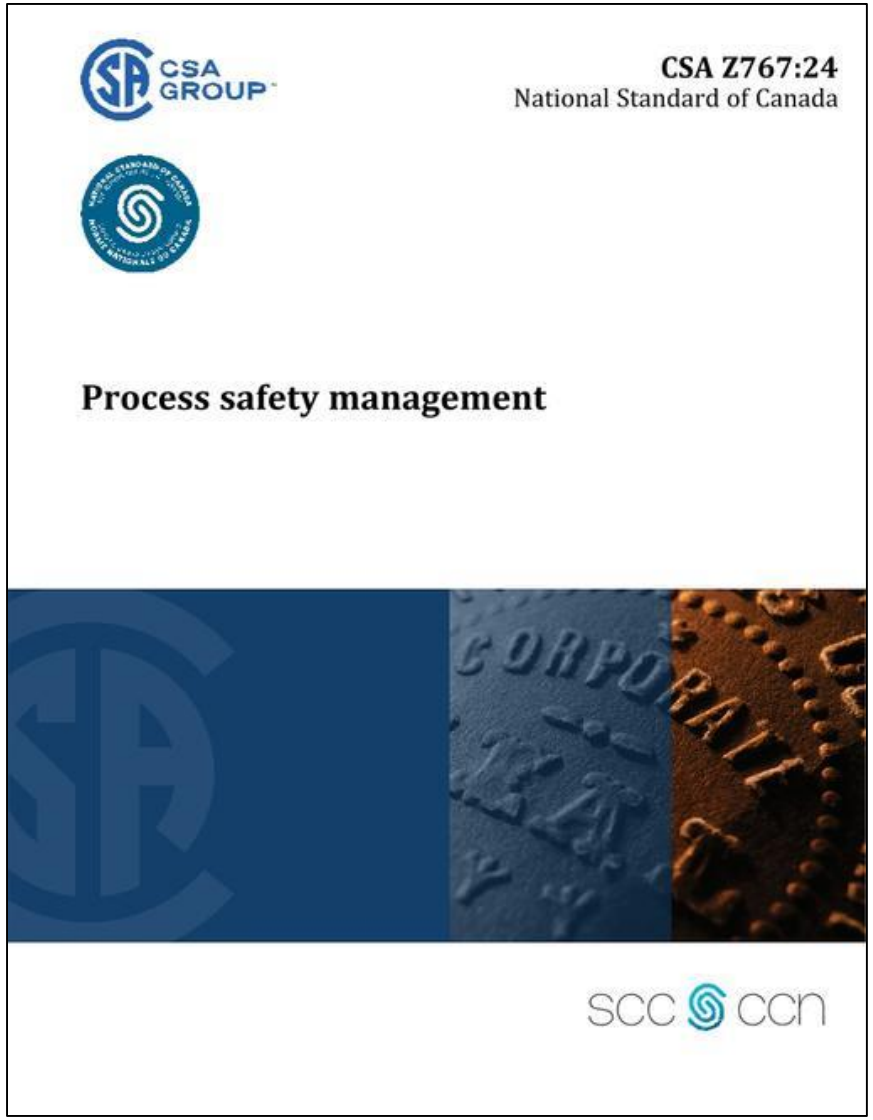
PSM IN CSA STANDARDS

ADRIAN PIERORAZIO | **SEPTEMBER 2024**

Highlights

Intro

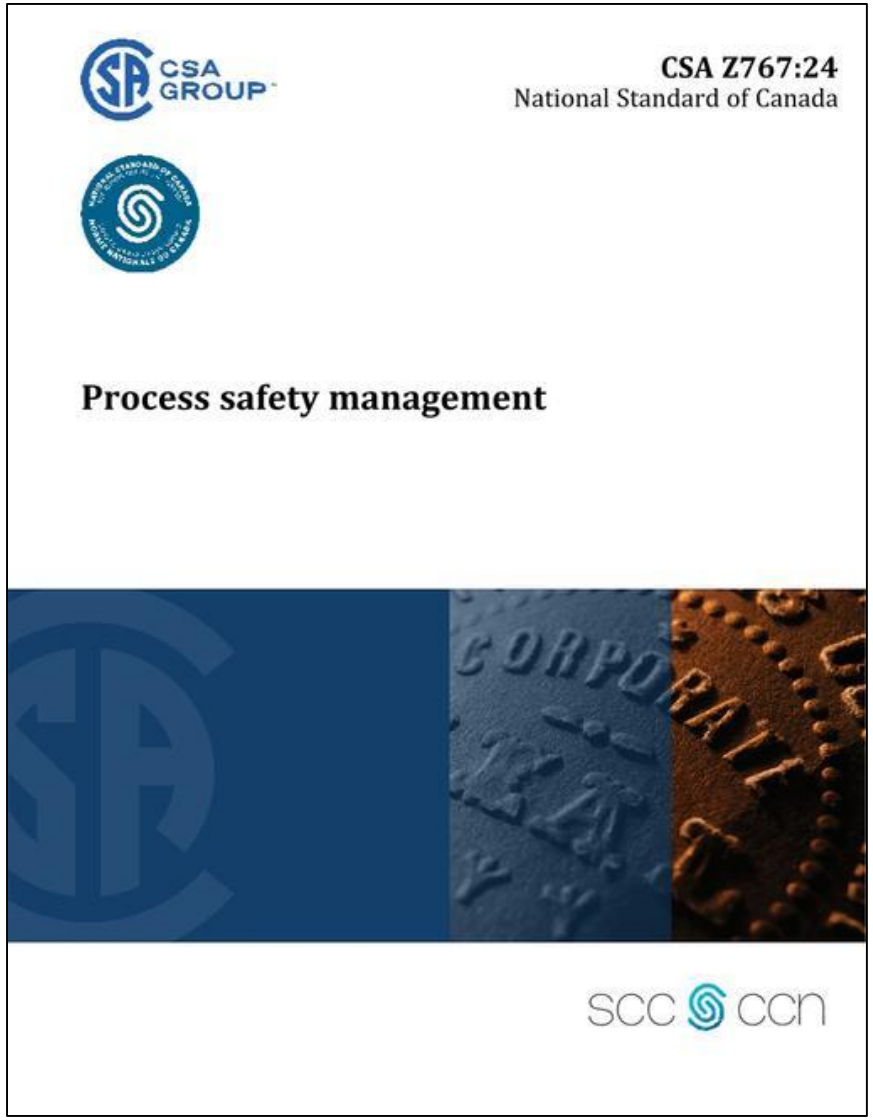
+ New Edition
+ Free Access
+ Adoption
+ Engagement with Other CSA Standards
+ Promotion



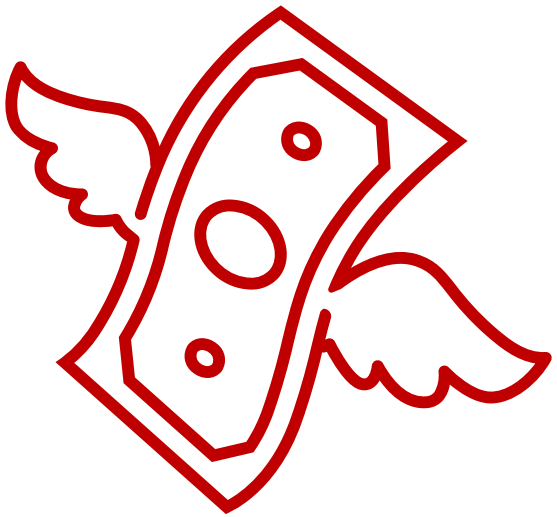
New Edition

2024 Edition

+ Update to 2017 Edition
+ Expansion of Conduct of Operations and Operational Discipline
+ More information around the Risk Management Framework
  - Includes revalidation
+ Human Factors significantly rewritten
+ Now explicitly allows engineering assessments



The Price is Right



Free View Access

+ Available through csagroup.org

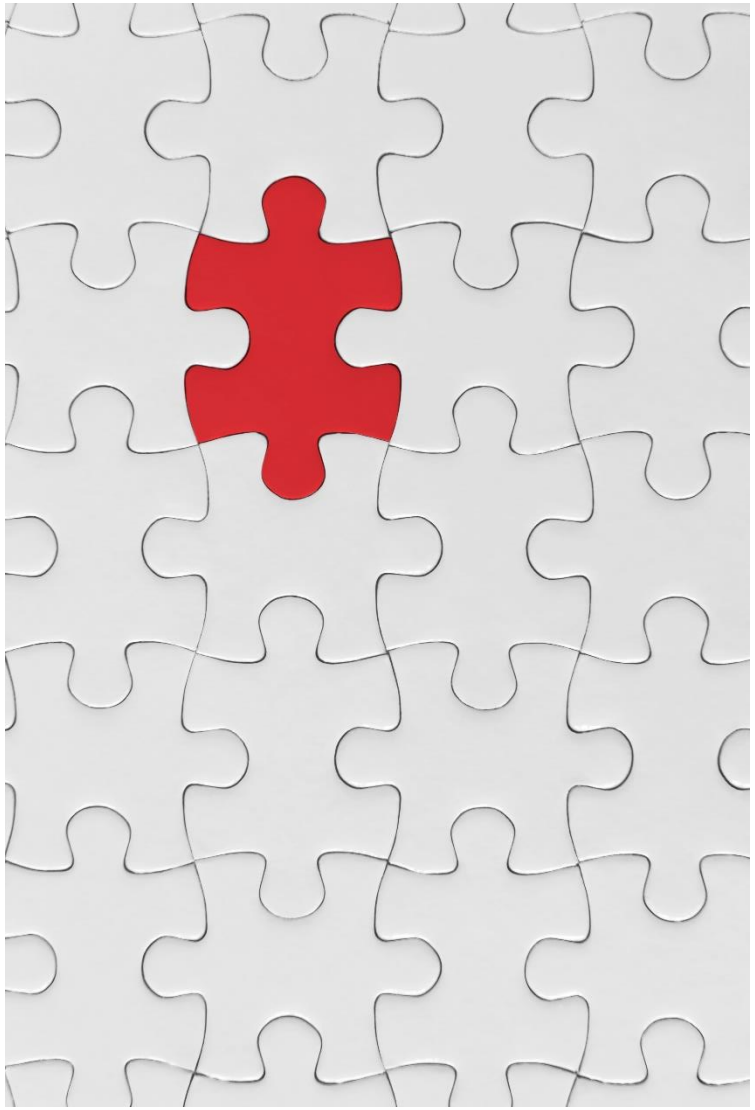
+ Provided by financial support from a donor
  - Requires a free CSA user account

Adoption

Regulators using z767

+ Technical Safety and Standards Authority (Ontario)
+ BC Energy Regulator
+ Canada Energy Regulator (proposed)
+ Referenced by CEPA in E2 Regulations (2019)
+ Strathcona County Requirements for Heavy Industrial Developments

Engagement with other CSA Standards



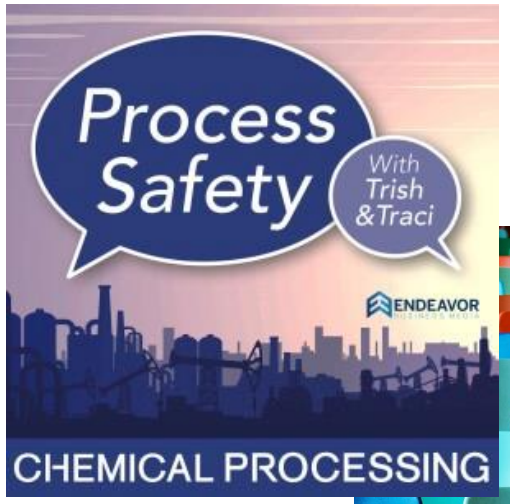
Building links in the CSA Ecosystem

- Portions of PSM already covered in other CSA standards
  - Differences in level of detail
- Goal is to find synergies and resolve conflicts
- Z662: Oil and Gas Pipeline Systems
- Z246.2: Emergency Preparedness and Response for Petroleum and Natural Gas Industry Systems

Promotion

Spreading the word

+ CCPS Canadian Meeting
+ Process Safety with Trish and Traci Podcast
  - World's First Process Safety Management Standard
+ Papers and presentations
+ Engagement with international standards



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Questions?

CSChE Process Safety Management Division: Activities and Collaboration Opportunities

Lianne Lefsrud, Treasurer of the PSM Division

Risk, Innovation, and Sustainability Chair (RISC) and Professor

David & Joan Lynch School of Engineering Safety & Risk Management, Chemical and Materials Engineering Dept, University of Alberta

PSM

Process Safety Management (PSM) Division

Chemical Institute of Canada | *For Our Future*

Institut de chimie du Canada | *Pour notre avenir*

History & Present

PSM
Process Safety Management (PSM) Division

History

- **Established in 1999** under the Canadian Society for Chemical Engineering (CSChE) and the Chemical Institute of Canada (CIC).
- **Originated** from the Major Industrial Accidents Council of Canada (MIACC), founded in 1987, in response to address major industry accidents, such as the Bhopal disaster (1984).
- **Mission**: continuation of MIACC's commitment to promoting and enhancing industrial safety.
- **Vision:** no industrial or transportation incidents involving loss of containment of hazardous material or energy; with potential to harm people, environment, or property; occur in Canada.

Today

- **A HUB for Process Safety in Canada**: fostering a community of volunteers and professionals.
- **Diverse Membership**: includes individuals from industry, academia, government, consults, and students.
- **25+ Years of Leadership**: PSM publications, education, and promotion in Canada
- **Key contributions**: developing PSM guidance documents, hosting symposiums, presenting awards, and providing training.
- **Influence**: shaping industry practices, education in Universities, and Canadian regulations and standards.

2024 Networking Opportunities: CSChE 2024 Toronto Conference & PSM Division Symposium Week

PSM Process Safety Management (PSM) Division

- **Three-days PSM technical program** packed with presentations and panel discussions
- **Social events**: opportunities for networking and collaboration
- **Joint meeting**: with CSA Z767 technical committee
- **Celebrating achievement:**
  - Fred Henselwood (NOVA Chemicals) for the PSM Award
  - Adrian Pierorazio (Jensen Hughes) for the CIC Fellowship

https://www.cheminst.ca/conference/canadian-chemical-engineering-conference-csche-2024/

2025 Collaboration Opportunities

PSM
Process Safety Management (PSM) Division

PSM Education & Promotion

- **PSM-Virtual Seminars** 2025 series
  - 1-hour free seminars, the second Thursday of the month, 12 PM ET
  - Seeking speakers who are interested in sharing their PSM knowledge and journeys.
- **CSChE 2025 Conference**
  - Early October in Montreal
  - Seeking connections and contacts for potential presenters.
- **Division meetings**
  - March, June, and October 2025
  - Open to both members and non-members

PSM Publications

- **Goal**: guidance PSM document(s) useable by all organizations, but targeting small and medium enterprises
- **Proposed Documents for 2025-2027**
  1) Roadmap for upper management buy-in to PSM
  2) PSM roll-out roadmap based on case study examples
- **Next Step**: seeking connections and contacts to collaborate on these publications
  - audience engagement survey
  - peer reviewers

Thank You! Questions?

PSM
Process Safety Management (PSM) Division

Join Our LinkedIn Group: stay updated on the latest events & activities

www.linkedin.com/groups/8146764

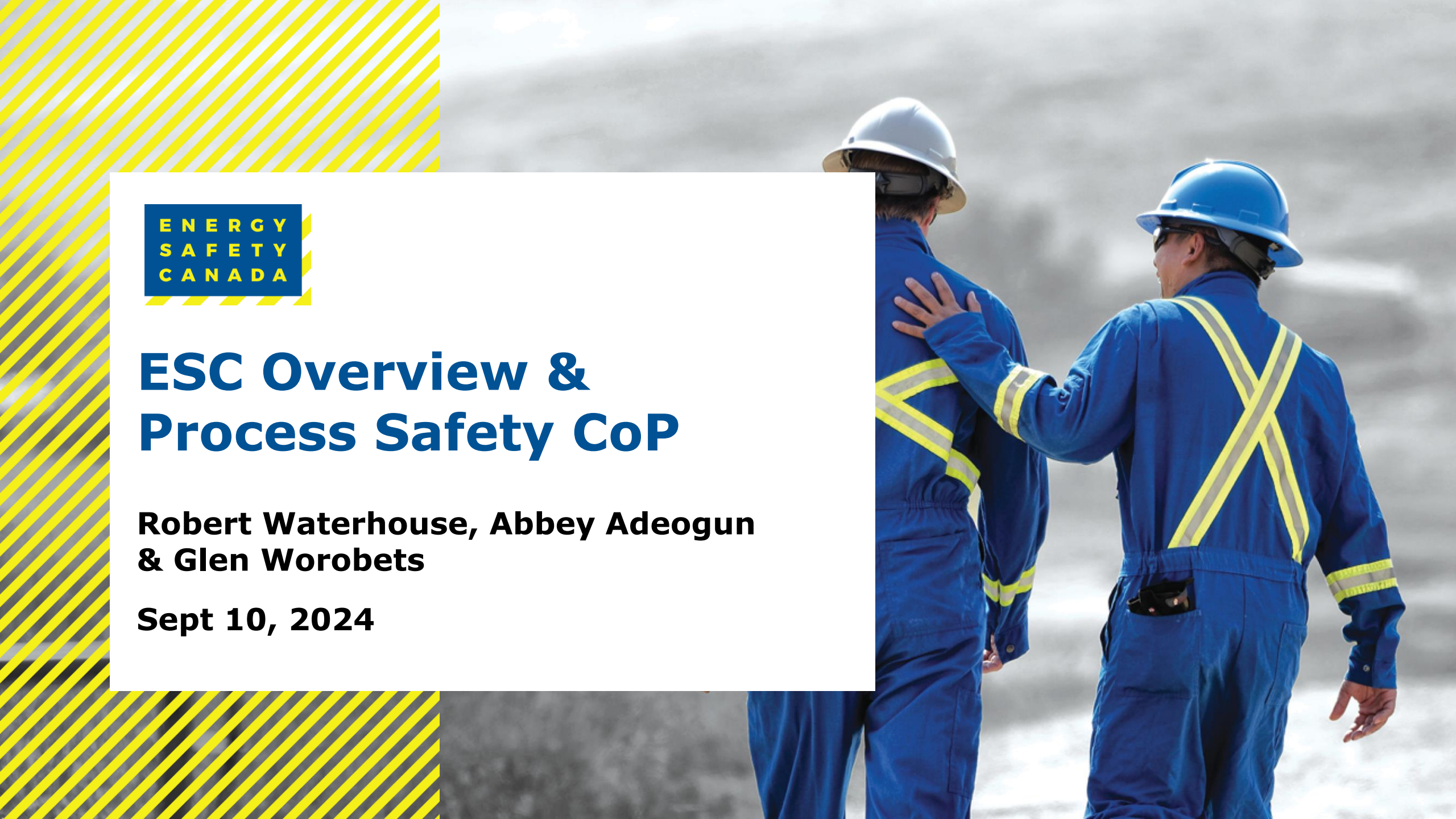
Never miss a post, turn on notifications for all posts from this group.

Visit Our Website: access past publications, webinars, and conferences materials

www.cheminst.ca/psm/

Contact us: email us if you're interested in collaboration & networking opportunities

PSMDivision@CSChE.onmicrosoft.com



ENERGY SAFETY CANADA

ESC Overview & Process Safety CoP

Robert Waterhouse, Abbey Adeogun & Glen Worobets

Sept 10, 2024

ENERGY SAFETY CANADA

The National Safety Association for Canada's Energy Industry

ESC | KNOWLEDGE HUB

Ready-made resources to help with everything from safety meetings to developing a safety system

- Industry Recommended Practices
- Program Development Guidelines
- Safety Alerts
- Safety Bulletins
- Toolbox Talks
- Videos, Posters & Checklists

ESC | GROUNDING AND BONDING VIDEO

ESC | GLOBAL NETWORKING & COLLABORATION

ENERGY SAFETY CANADA

Communities of Practice is a way for industry to keep up with emerging H&S issues & share ideas

1. Pipeline
2. Dropped Objects
3. Human & Organizational Performance
4. Life Saving Rules & Potentially Serious Injuries
5. Get a Grip
6. Process Safety
7. Workplace Exposures*
8. Regional – SK, BC & Oil Sands
9. Targeted Interventions Strategy

* New for fall of 2024

ESC PSM Opportunity

Continuum of areas and needs around process safety

Some areas less of a fit for ESC

Other organizations better situated to assist

Collaborate with IOGP, CSChE, IChemE, CSA, CCPS, Safer Together, etc.

ESC | PROCESS SAFETY COP ACTIVITIES

- CoP established in 2022
  - 20 Companies participating
  - 10 meetings held to date with two more planned for 2024
- Presentations
  - 8 Companies shared their journey in process safety
  - 8 topic presentations such as:
    - Pipeline System Safety Metrics - Graham Emmerson
    - Critical Controls - WorkSafeBC (Guests)
    - CSA Z767 – Graeme Norval and Parnian Jadidian
    - Leadership – Rhonda Schmidt (Cargill)
    - Hazop Learnings – Richard Carter (Watchmen)
- Developed a process safety game for ESC’s 2024 Safety Conference

ESC | WORKSHOP & NEW ISSUE PROPOSALS

A workshop was held in 2024 to help inform the groups work activities in the future

- Key Takeaways centered around:
  - Leadership
  - Process Safety Envelope and Element Understanding
  - Integration
- These areas and resulting solution-centred ideas will inform future resources the CoP creates

New Issue Proposals

- Update and release Safety-Critical Equipment Guide*
- Process Safety Games
- What does this group think of these two ideas?

* Former CAPP Guide

ENERGY SAFETY CANADA

Questions & Answers

An AIChE Technology Alliance

CCPS

Center for Chemical Process Safety

9th Annual Canadian Regional Meeting
September 10, 2024
How CCPS Can Assist Your Process Safety Journey

Michele Horwitz
Associate Director, CCPS Membership
michh@aiche.org
646-495-1371

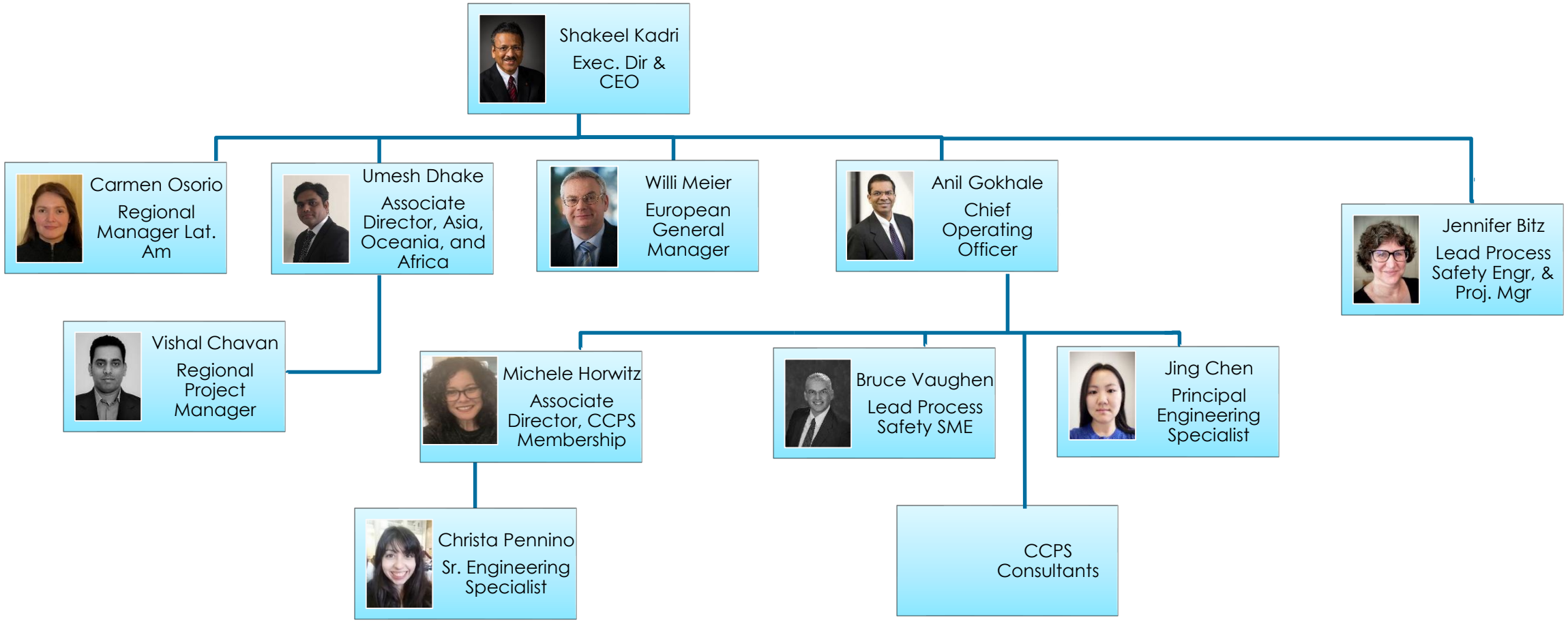
About CCPS

An AIChE Technology Alliance
CCPS
Center for Chemical Process Safety

- Not for profit organization supported by Corporate Members globally
- It is part of the American Institute of Chemical Engineers [AIChE]
- Started on 23 March 1985, in response to the Bhopal Union Carbide tragedy
- HQ located in New York City, offices in Mumbai, Frankfurt and Houston (representing Latin America Region)

CCPS Staff

An AIChE Technology Alliance
CCPS
Center for Chemical Process Safety



CCPS CANADIAN MEMBERS

An AIChE Technology Alliance
CCPS
Center for Chemical Process Safety

AON
Empower Results®

ATCO EnPower

Berkshire Hathaway Specialty Insurance

Canadian Natural

cenovus ENERGY

CHEMTRADE

JENSEN HUGHES
Advancing the Science of Safety

NOVA Chemicals®

NWR
NORTH WEST REDWATER PARTNERSHIP

PARKLAND

Rio Tinto

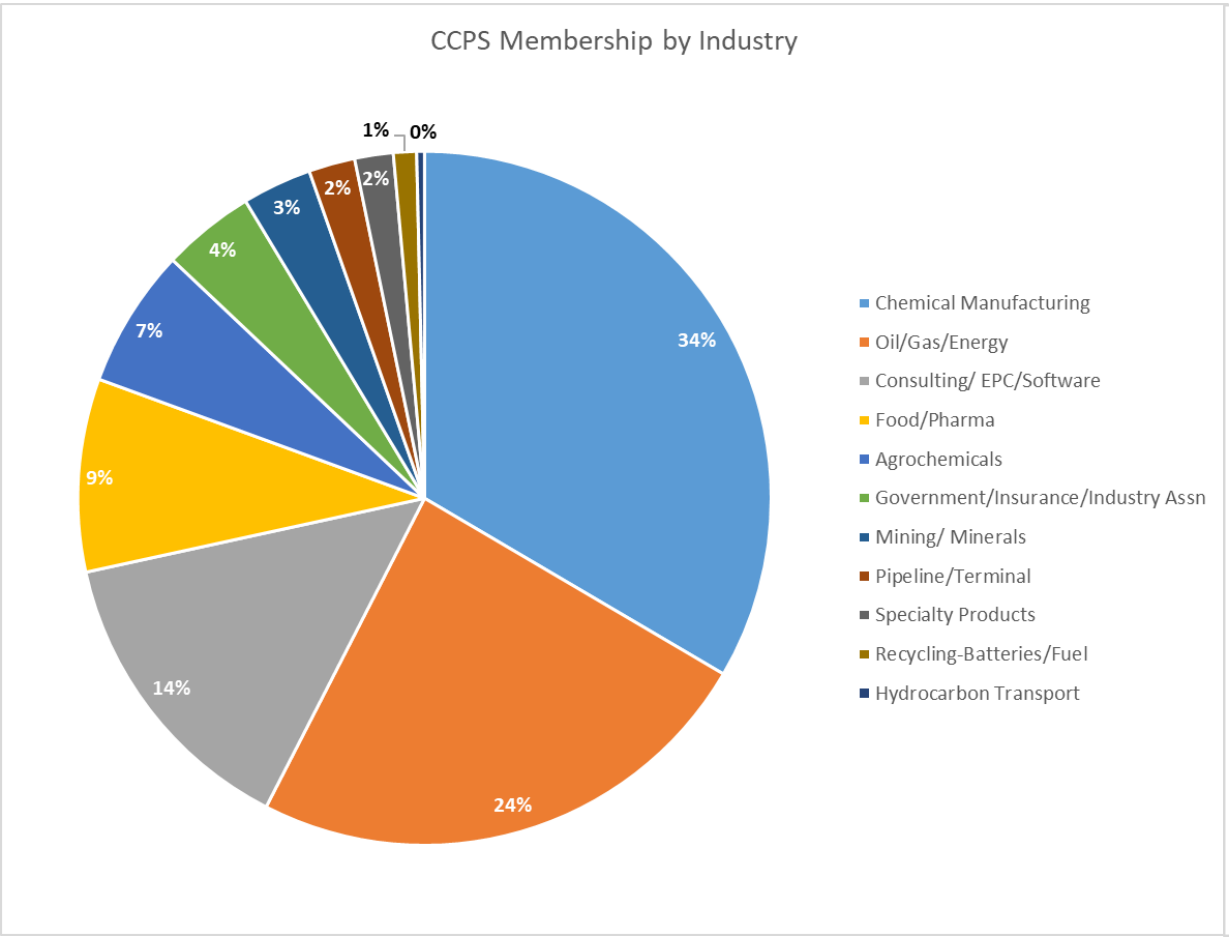
TC Energy

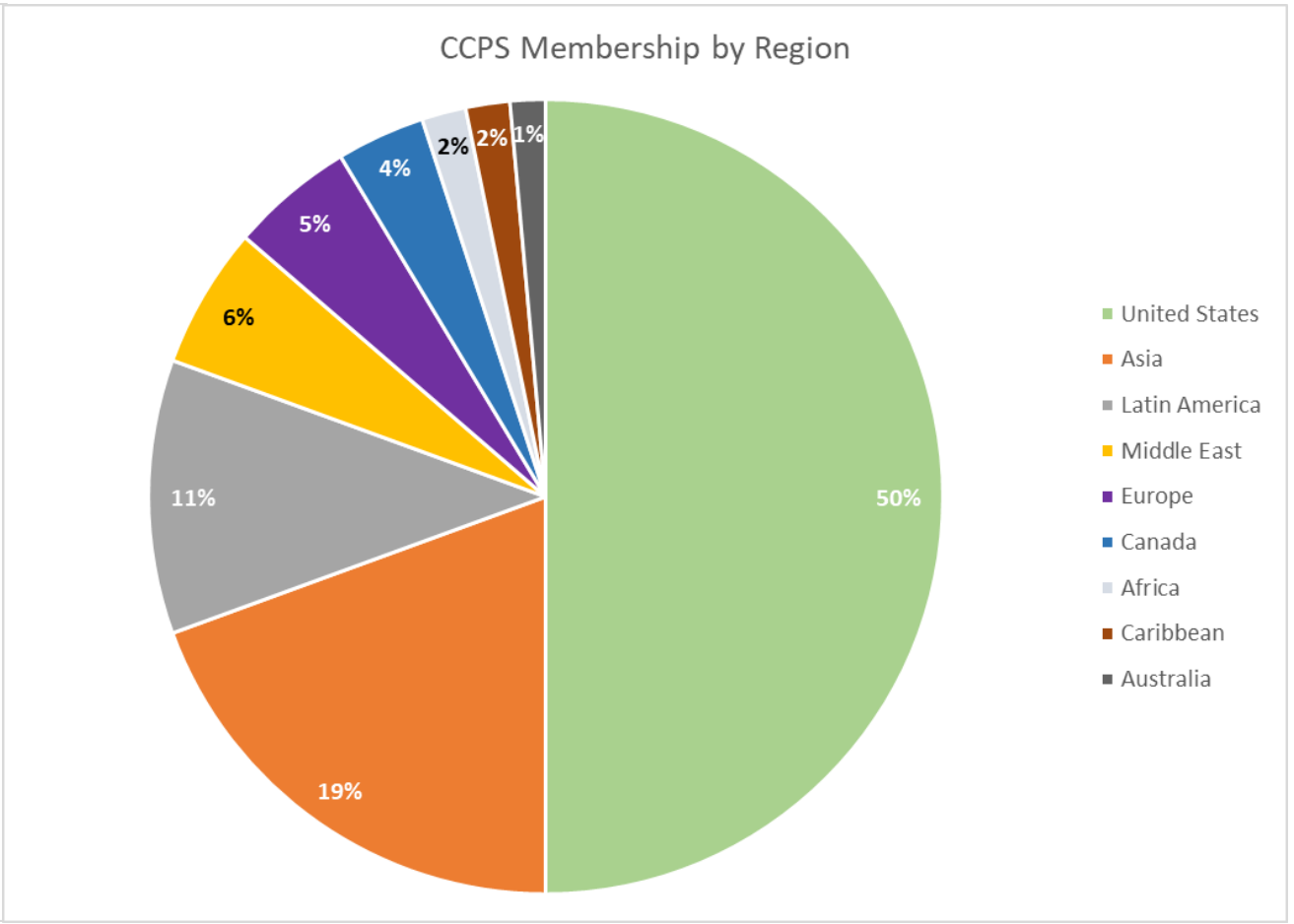
T N Trans-Northern // Trans-Nord

62 Organizations in Attendance as of 9/2/24 (18 Mbr. Comp)

- AIS Integral Ltd.
- **AON Energy Risk Engineering (M)**
- ARC Resources Limited
- **ATCO Energy Solutions Limited (M)**
- AXA XL
- **Berkshire Hathaway Specialty Insurance (M)**
- **Canadian Natural Resources Ltd. (M)**
- **Cenovus (M)**
- **Chemtrade Logistics (M)**
- ConocoPhillips
- Co-op Refinery Complex
- CVE
- Davont Inc.
- **Dow Chemical Company(M)**
- Enbridge
- Energy Safety Canada
- EPCOR Utilities Inc.
- **Equate Petrochemical Company (M)**
- **Fluor (M)**
- Gibson Energy
- HF Sinclair (Petro Canada Lubricants)
- **Imperial Oil/Exxon (M)**
- INEOS
- Intact Insurance Specialty Solutions
- Inter Pipeline
- **Jensen Hughes (M)**
- Kent PLC
- Keyera
- Lean Options Consulting Inc.
- Liberty Mutual Canada
- LIVE Electrical & Controls Ltd.
- LUPATECH Canada
- Meg Global Canada ULC
- NFP Canada
- **Nova Chemicals (M)**
- Orano
- Ovintiv
- Paramount Resources
- **Parkland Corporation (BC) Ltd. (M)**
- Pembina Pipeline Corporation
- **PETRONAS CANADA (M)**
- Plains Midstream Canada ULC
- PMO Global Services
- Risk Alive Analytics Inc.
- Risktec
- RskLess
- Risktec Solutions, Inc.
- Sherritt International PE
- Strathcona County
- Suncor Energy
- Syncrude Canada Ltd.
- TAQA North Ltd.
- **TC Energy (M)**
- **Telluride Engineering (M)**
- Timbers Consulting
- Trans Canada Pipelines Ltd.
- **Trans-Northern Pipelines Inc.(M)**
- **TUV Rheinland Taiwan Ltd. (M)**
- University of Alberta
- Voovio
- Watchmen Instrumented Safety Experts
- Worley Canada

CCPS Membership by Industry and Region [2024]





281 Member Companies (September 2024)

An AIChE Technology Alliance

CCPS Center for Chemical Process Safety

THE GLOBAL COMMUNITY COMMITTED TO PROCESS SAFETY

Global / Regional Engagement

An AIChE Technology Alliance
CCPS
Center for Chemical Process Safety

CCPS Canada Regional Meeting Calgary September 10, 2024

Global Conference on Process Safety & Big Data Frankfurt am Main October 29-30, 2024

8th Global Summit on Process Safety Mumbai, India November 26-27, 2024

CCPS Trinidad & Tobago Meeting Oct 10, 2024

10th Latin America Conference on Process Safety September 18-20, 2024 Barranquilla, Colombia

CCPS Regional Paris France October 2, 2024

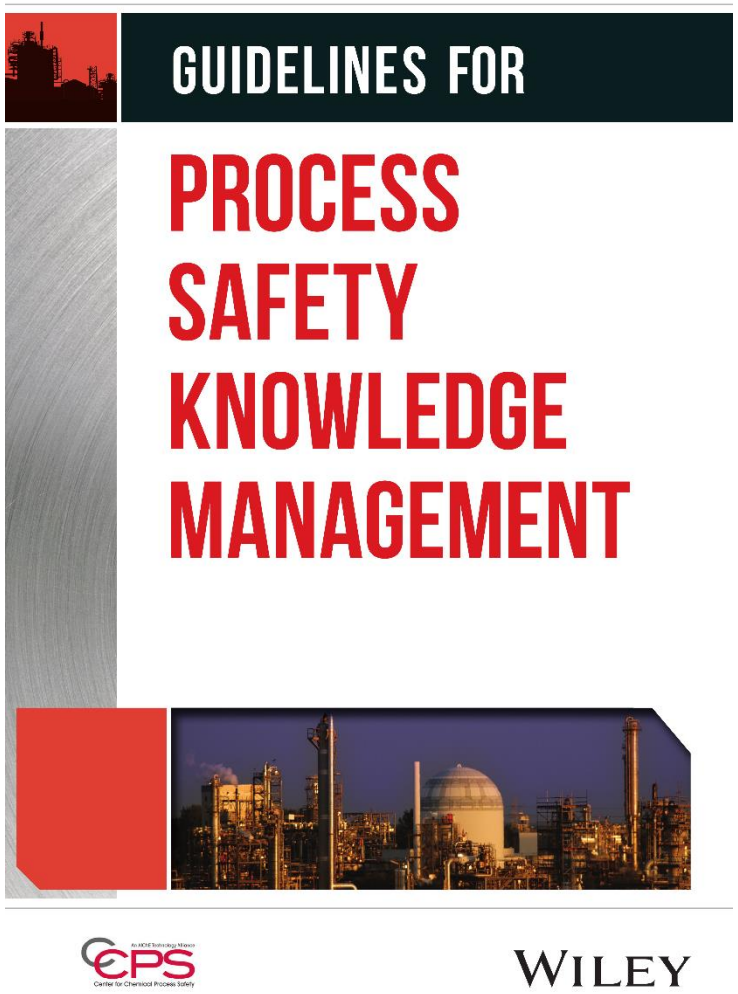
CCPS South East Asia Regional Meeting - October 10, 2024 Singapore

Fall TSC Meeting Houston November 13-14, 2024

CCPS Membership Benefits

Education and Training

- Classroom and eLearning Content
  - LOPA
  - HAZOP Studies and other PHA Techniques for Process Safety and Risk Management
- In Person Training & Continuing Education
  - Risk Based Process Safety
  - Incident Investigation
  - Human Factors for Safety & Improved Performance
- Boot Camps – Taught by 30+ Year Veterans – Members get $3K savings on Boot Camps
  - Presented virtual or at company site, related to company goals and objectives
- Free eLearning Courses for New Member Companies
- Free Sponsored Webinars for member companies >90
- Free CCPS course opportunities for newly launched CCPS courses
- Member Discounts on Conference or Education Training



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CCPS Members get sent new books Complimentary

35% discount off previously published books – send Michele Horwitz michh@aiche.org email for promo code

Monographs

An AIChE Technology Alliance
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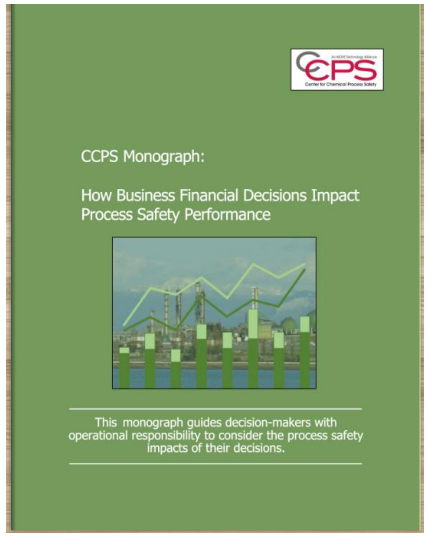

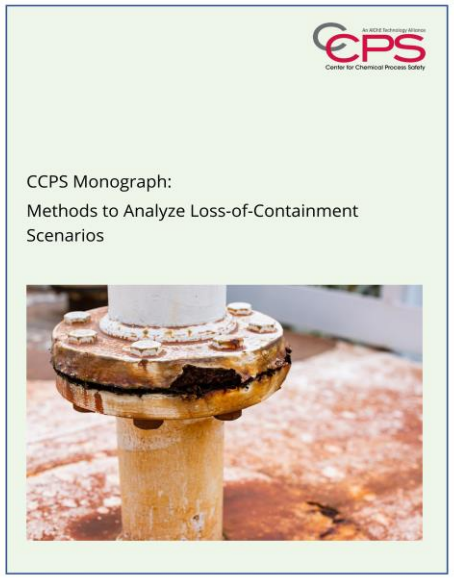

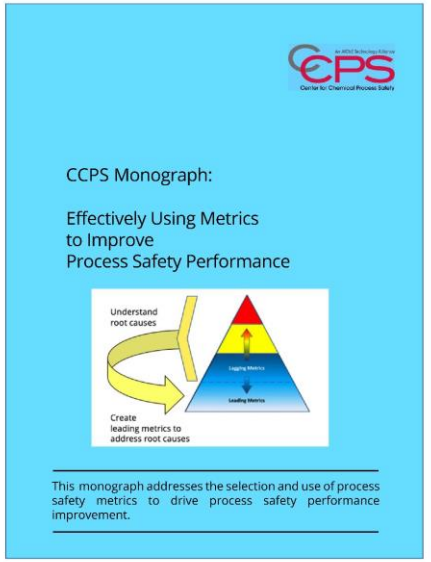

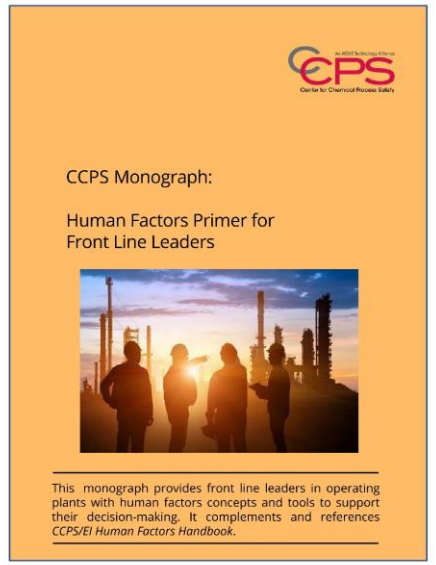

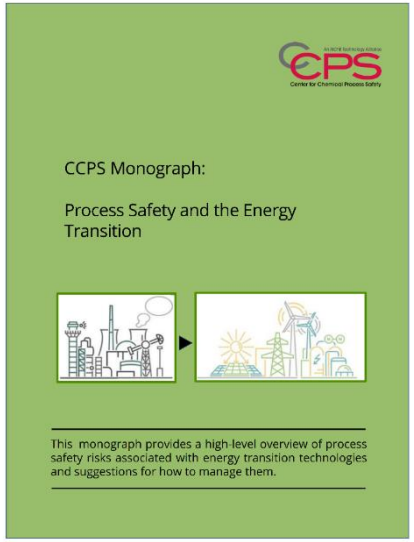

Available online at CCPS

Available Online

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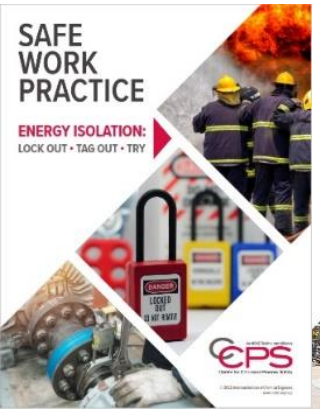
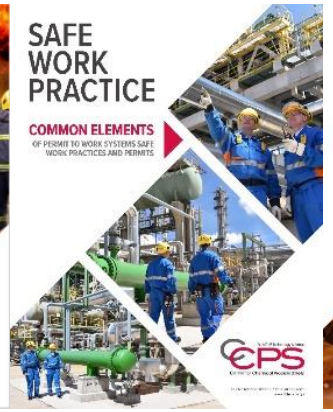
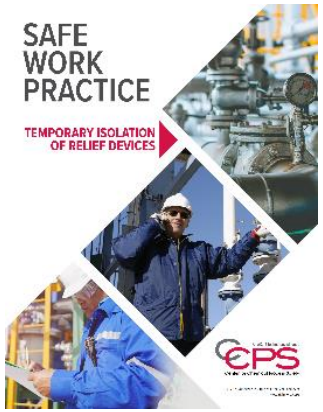
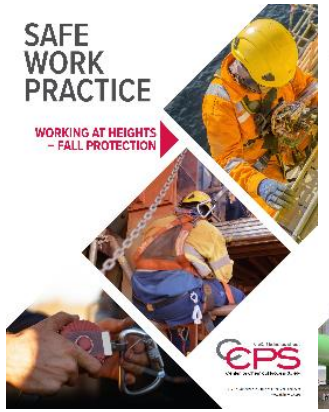
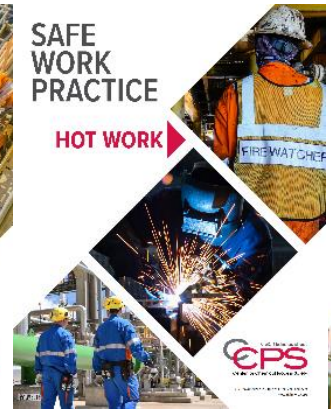
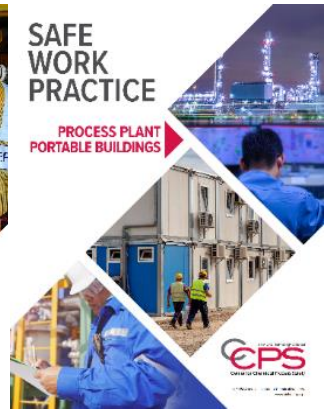


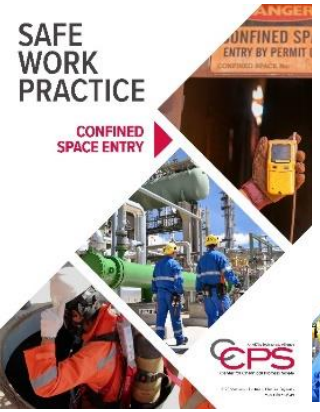


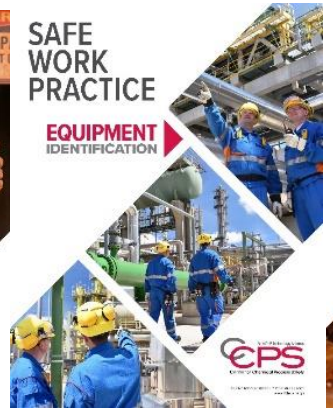


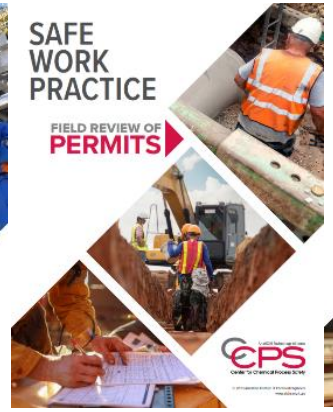


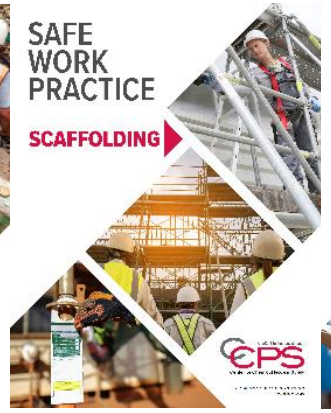


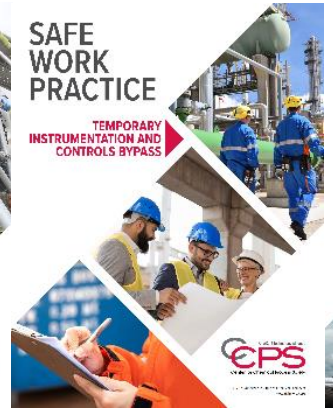


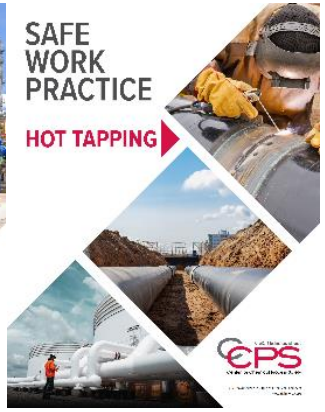


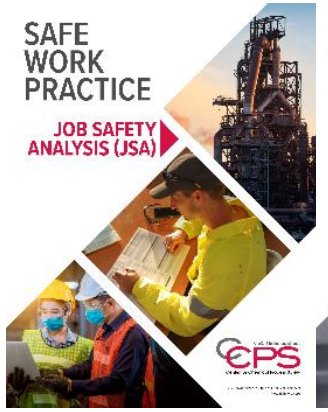


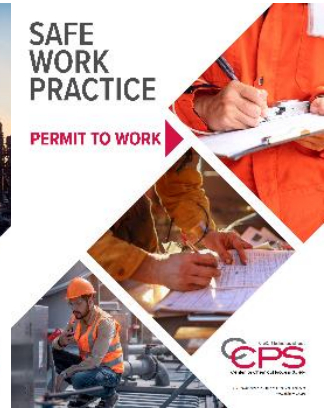








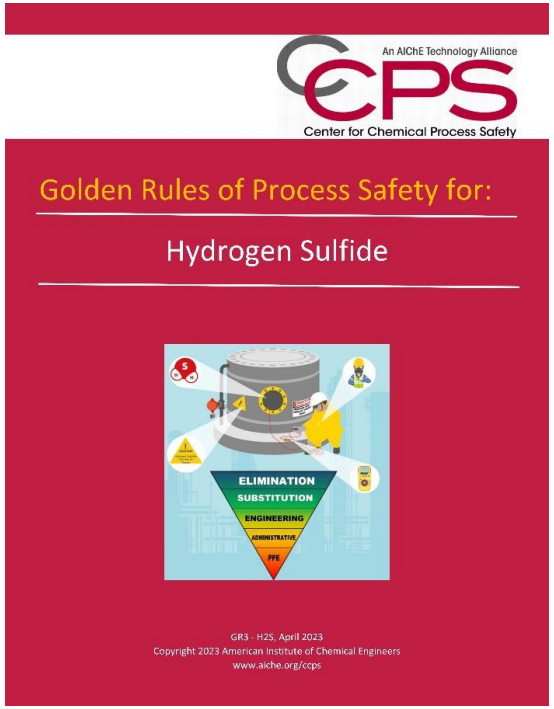


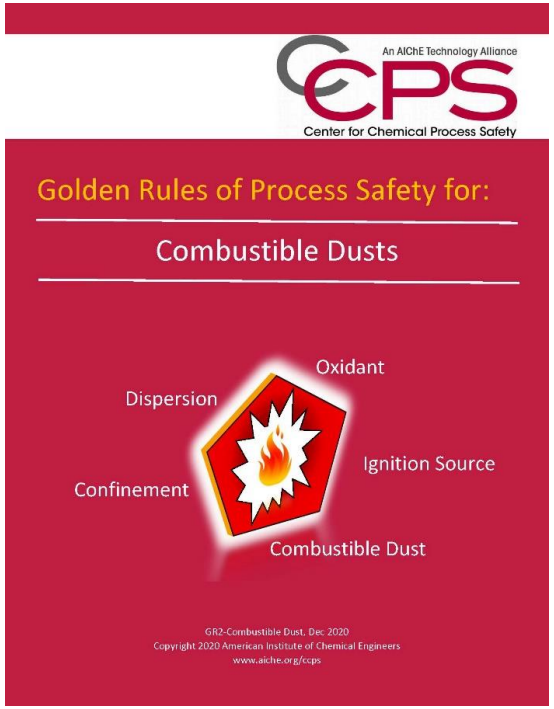


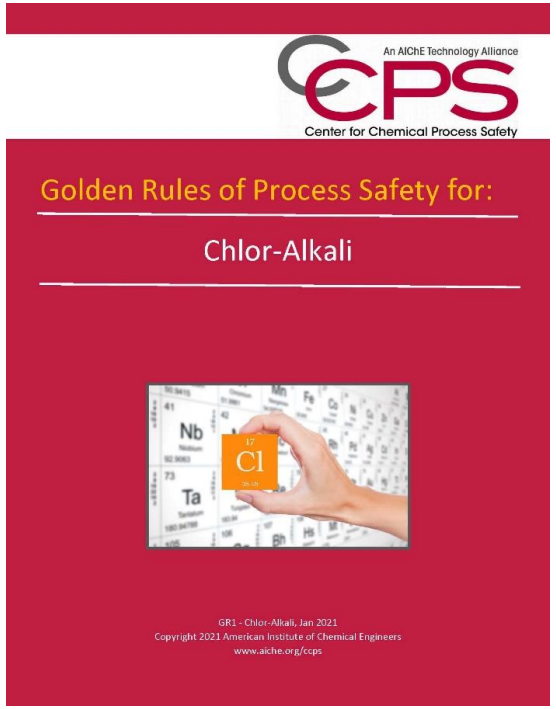
Work in Progress

- SIMOPS
- ….. And a few more

Golden Rules of Process Safety







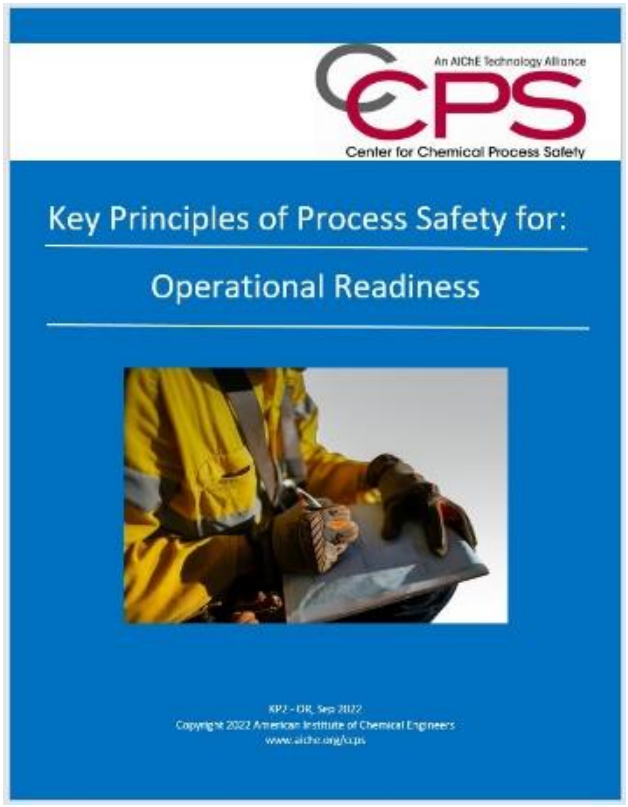
Available online at CCPS

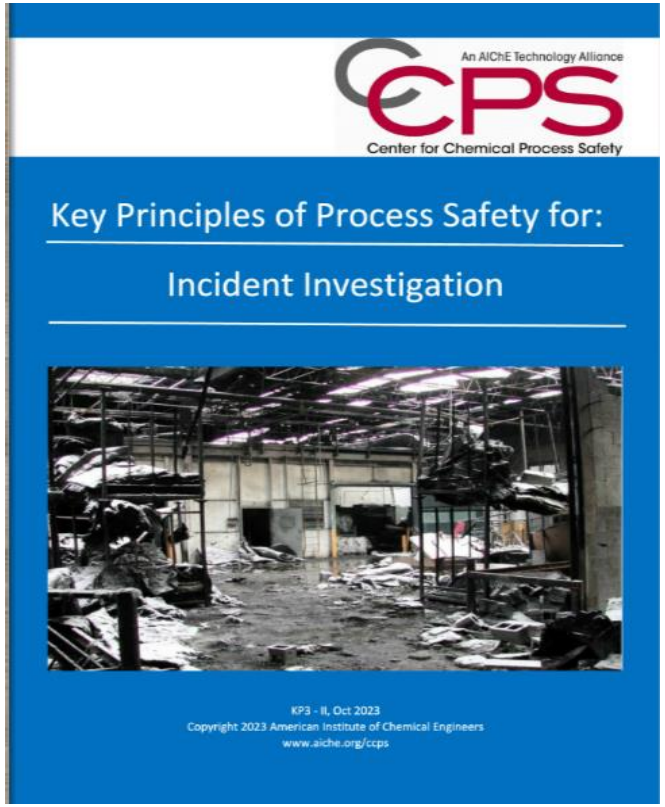
In Development

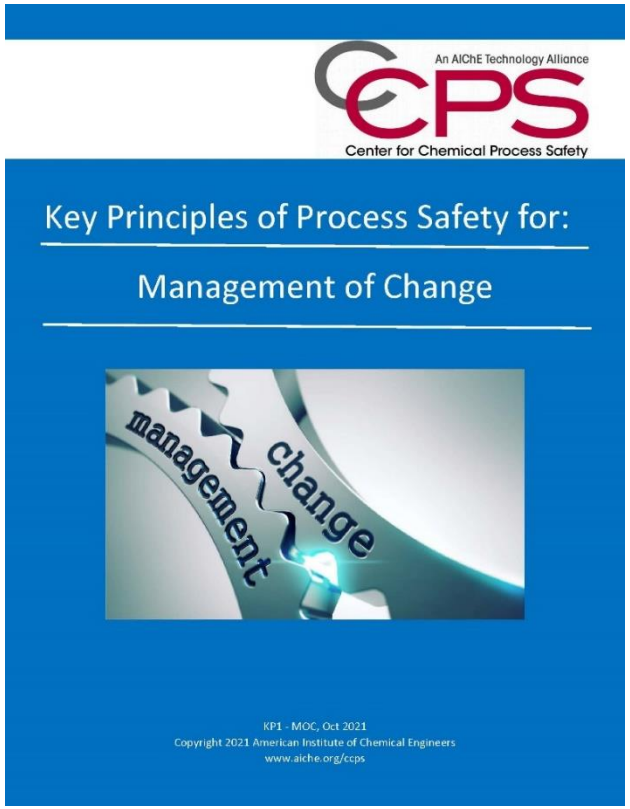
- Anhydrous Ammonia
- Phosgene
- LNG
- Ethylene Oxide
- Flammable Liquids (2024)
- Ammonium Nitrate (2024)

Key Principles of Process Safety

An AIChE Technology Alliance
CCPS
Center for Chemical Process Safety







CCPS Tools

CCPS provides process safety professionals with a variety of free tools that include worksheets, databases, process safety metrics, a glossary, safe work practices, and tools for risk analysis screening and chemical hazard engineering fundamentals.

- **Chemical Reactivity Worksheet**
- **Golden Rules**
- **LOPA Database (M)**
- **Process Safety Incident Database (M)**
- **Process Safety Incident Evaluation (PSIE)**
- **Process Safety Metrics**
- **Process Safety Beacon**
- **Process Safety Glossary**
- **Professional Services Directory**
- **RBPS Resources Web Tool**
- **RAST and CHEF (M)**
- **Safe Work Practices**
- **Vision 20/20 Self Assessment Tools**

Process Safety Beacon
Messages for Manufacturing Personnel
www.aiche.org/ccps/process-safety-beacon

aiche.org/ccps

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Toxic Gases — March 2023

Figure 1. Chlorine release from a dropped cylinder
Source: https://www.voanews.com/a/jordan-negligence-responsible-for-aqaba-chlorine-tank-explosion-/6644453.html

What Happened?

On June 27, 2022, a 25-ton isotainer of liquefied chlorine gas was being loaded onto a ship by a crane in Aqaba, Jordan. A lifting cable snapped, and the tank crashed onto the ship's deck and ruptured. A huge cloud of toxic yellow chlorine gas formed and workers evacuated the area. Thirteen people were killed and about 300 others were hospitalized.

Officials stated the tank's weight was "three times more than the cable load capacity," and the required safety measures for dealing with such hazardous material were not in place. No qualified person was on the deck at the time to check the lifting equipment and procedures.

Experts said the incident could have become a catastrophe had dozens of workers ending a shift not left the site shortly before the leak. Fortunately, winds also blew the toxic gas away from populated areas in the port city to the outlying desert.

Precautions should be taken during chemical unloading operations in case of leaks, whether the materials are solids, liquids or gases. In this case, there were a number of people close to the loading area who did not need to be there at the time of the incident.

Did You Know?

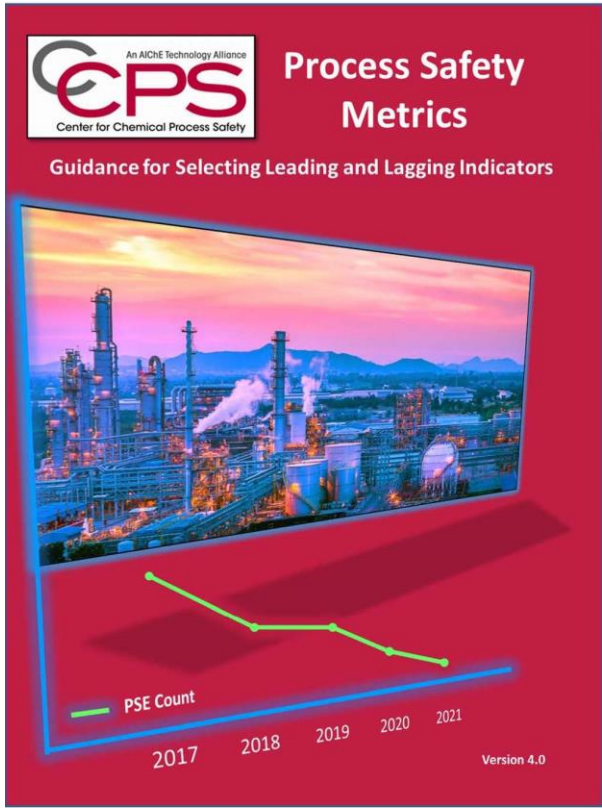
- Toxic gases can cause poisonous effects at relatively low concentrations when in contact with the human body.
- Toxic gases are normally grouped as irritants like chlorine and ammonia, asphyxiants like nitrogen and carbon monoxide, anesthetics like nitrous oxide, and special toxicants like hydrogen sulfide and hydrogen cyanide.
- Inhalation of toxic gases can be swiftly fatal as the lungs provide a direct route to the blood stream. Some materials can also be absorbed through the skin and eyes.
- Toxic gases are especially dangerous because they are commonly stored and transported under pressure. They rapidly expand and move through the air when released. Many, like hydrogen sulfide and carbon monoxide, are invisible and have unreliable or no odor warning properties.
- Lifting operations are dangerous work. In some companies and countries, a formal lift plan is required. Essential elements of such plans and safety practices for heavy lifts in areas where highly hazardous materials are present will be covered in a future Beacon.

What Can You Do?

- Preparation for materials handling operations involving toxic gases should always include what to do if a release occurs:
  - ✓ Always be aware of the materials being handled, equipment in use, people and surroundings in the areas where you work.
  - ✓ Read and heed the warnings on labels, placards and signs where toxic gases are stored and used.
  - ✓ Stay well away of lifting operations and warn other personnel who are too close to move away.
  - ✓ Know where to go and what procedures to follow if there is a release.
  - ✓ Be gone, not drawn to toxic gas releases unless you are trained and equipped as an emergency responder. Move cross-wind and away from the path of the gas release to approved safe havens and shelter-in-place locations.
  - ✓ Don, test-for-fit and use respirators, other personal protective equipment and portable gas detectors where authorized, available and suitable for the release at hand.

Toxic gas exposures can be fatal. Take the correct actions to protect yourself and others.

Available in 41 languages
Used as a training tool
Comes Monthly to your inbox



4th Edition

Process Safety Incident Database (PSID)

What can I find in the database

Incident Source
Country
Year
Date
Incident Name
Photo (if shared)
Injuries (Y/N)
Location
Short Description (open ended)
Incident Type (pull down)
Ignition Source
Description (open ended)
Key Learning – Descriptions (Multiple answers)
Recommendations
Causes

- Initiating Cause Details
- Root Cause and Cause and Causal Factors
- System Failures
- Safeguard Failures
- Impact

Attributes
Industry Types

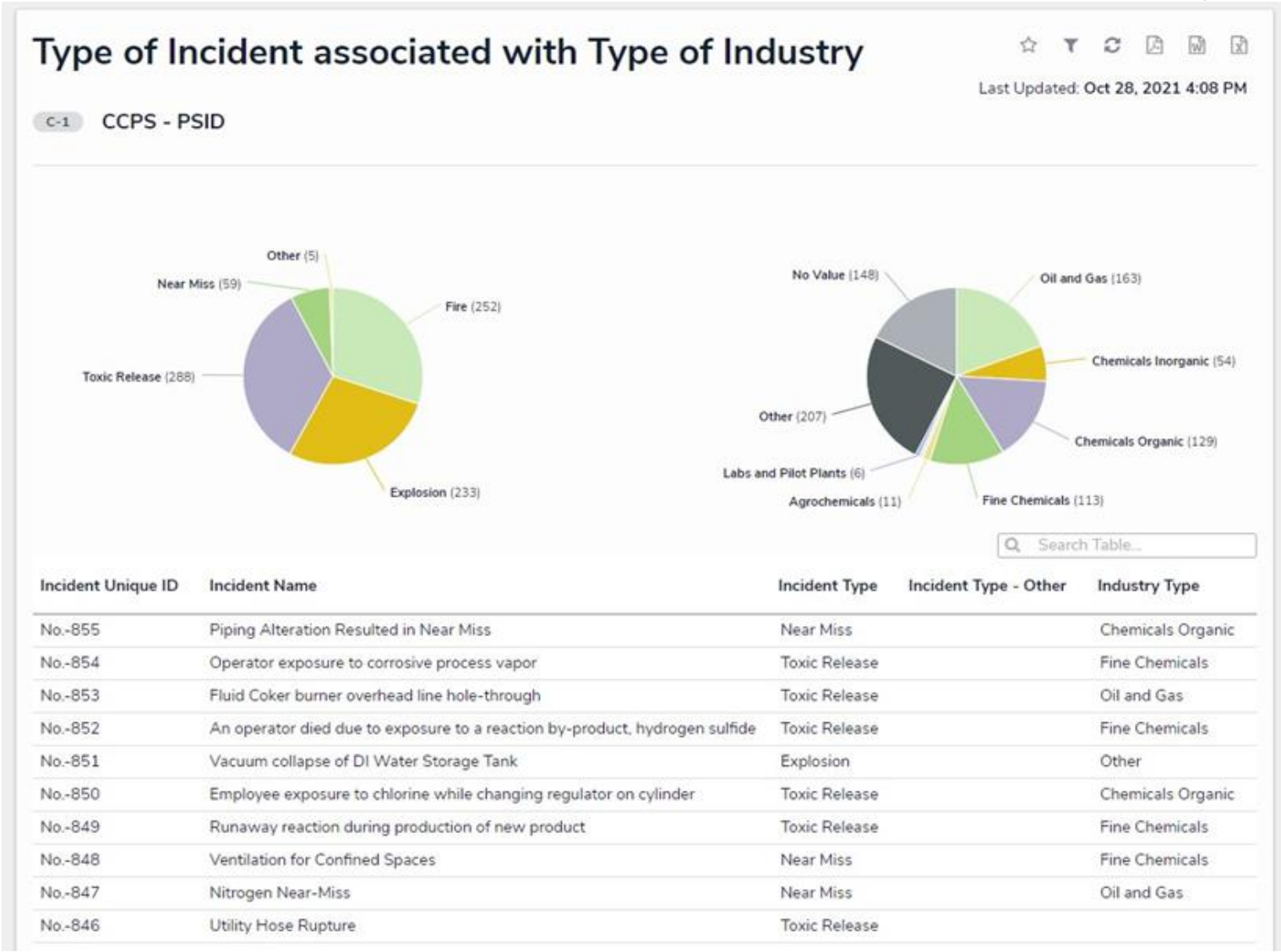
- Industry Type

Mode of Operation
Equipment Categories

- Equipment Type

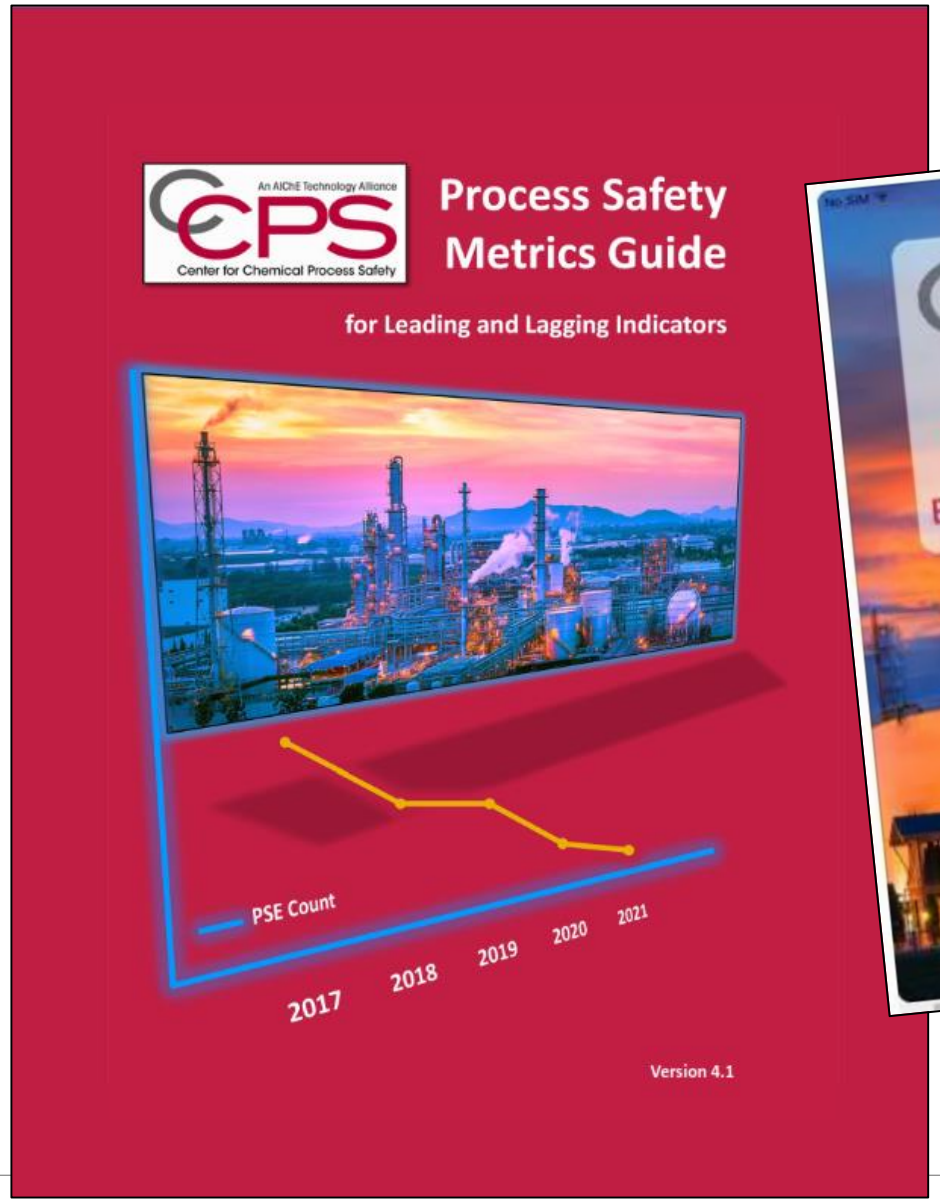
Chemical Hazards

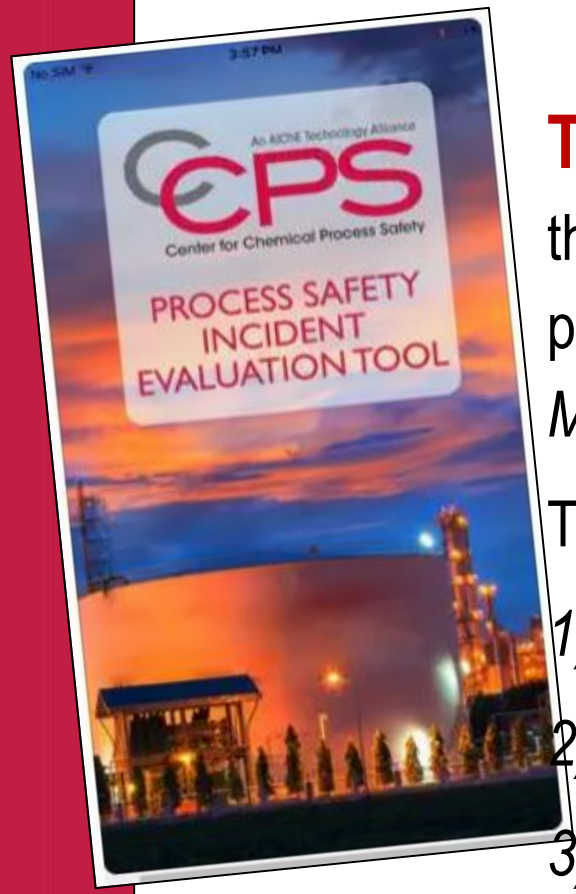
- Chemical, Quantity, Unit of Measure, Phase, Type of Release



Incident Unique ID	Incident Name	Incident Type	Incident Type - Other	Industry Type
No.-855	Piping Alteration Resulted in Near Miss	Near Miss		Chemicals Organic
No.-854	Operator exposure to corrosive process vapor	Toxic Release		Fine Chemicals
No.-853	Fluid Coker burner overhead line hole-through	Toxic Release		Oil and Gas
No.-852	An operator died due to exposure to a reaction by-product, hydrogen sulfide	Toxic Release		Fine Chemicals
No.-851	Vacuum collapse of DI Water Storage Tank	Explosion		Other
No.-850	Employee exposure to chlorine while changing regulator on cylinder	Toxic Release		Chemicals Organic
No.-849	Runaway reaction during production of new product	Toxic Release		Fine Chemicals
No.-848	Ventilation for Confined Spaces	Near Miss		Fine Chemicals
No.-847	Nitrogen Near-Miss	Near Miss		Oil and Gas
No.-846	Utility Hose Rupture	Toxic Release		

The Process Safety Incident Evaluation (PSIE) app has been updated!





The PSIE changes reflect the updated threshold quantities and calculations provided in the *CCPS Process Safety Metrics Guide* and API RP 754, *Ver 4.1*.

The PSIE app has four main features:

1) *A database of 2,000 chemicals*
2) *A PSIE questionnaire*
3) *A Tier 1 incident severity weighting*
4) *An enhanced reporting feature*

INTERNATIONAL PROCESS SAFETY WEEK

QR code for the event

Center for Chemical Process Safety

IChemE Safety Centre

Mary Kay O'Connor Process Safety Center
Texas A&M Engineering Experiment Station

EPSC

FIRE AND BLAST INFORMATION GROUP

CCPS Global Congress on Process Safety Spring Meeting 2025

An AIChE Technology Alliance
CCPS
Center for Chemical Process Safety

SPRING25
+21ST GCPS
A Joint AIChE and CCPS Meeting

https://www.aiche.org/conferences/aiche-spring-meeting-and-global-congress-on-process-safety/2025

April 6-10, 2025
Hilton Anatole, Dallas, Texas, USA
Submit an Abstract


Thank you ...

2025 CCPS Project Ballot

2025 CCPS Proposed Projects
TO: CCPS Technical Steering Committee (TSC) Members

FROM: Jennifer Bitz, CCPS Lead Process Safety Engineer
Fred Henselwood, Nova Chemicals, CCPS Planning Committee Chair

DATE: September 4, 2024

SUBJECT: 2025 Project Ballot
CC: CCPS Governing Board Members

This report presents the CCPS Planning Board's recommended proposals for new projects. These proposals were developed based on input from the Technical Steering Committee (TSC) and CCPS Governing Board. Please review these proposals carefully, with the key individuals at your company.

Your company's vote is essential in defining the future direction of CCPS and the overall direction of process safety. All CCPS member companies are urged to submit a ballot. Our goal is 100% participation!

The primary opportunity to discuss these proposals in-depth will be at the September Web TSC Meeting on September 25, 2024.

If you plan to attend the September Virtual TSC meeting (September 25), it is preferable to wait until then to vote, as the planning board chair and project champions are expected to present the projects that are listed on the ballots. However, if you are unable to attend and wish to vote, please review the 2025 Project Proposals in this document in detail.

The results of the TSC voting on these recommendations will be used per CCPS project budgeting policy in selecting projects for authorization based on available funds, available subcommittee volunteers, and staffing.

Please review the recommendations for new projects listed in the attached ballot and described in the attached Proposals. Evaluate the Proposals on the following attributes:

NEW PROJECT EVALUATION AND VOTING

Significant	**Can provide an important contribution to process safety**
Unique	**Not already covered by existing resources**
Well-defined	**Reasonably specific objectives and scope**
Feasible	**Attainable with available CCPS resources**
Timely	**Needed, or will be useful when project is completed**
Valuable	**Provides value to Sponsors and Stakeholders, and favorable cost/revenue potential to CCPS**

2025 CCPS Project Ballot

2025 CCPS Proposed Project

The CCPS Project Ballot can be accessed using the address below:

https://www.aiche.org/ccps/resources/forms/2025-ccps-project-ballot

Each CCPS member company is asked to vote for and prioritize their company project choices noting the order of preference.

The ballot should indicate first (mark "1"), second (mark "2"), third (mark "3"), or not interested in this project, choices.

For the proposals listed under the Sprint (Yes/No) section of the ballot, each project should be given a yes or no to guide the funding of these proposals. Voting for any of the yes / no proposals will not impact the prioritization of the projects on the ranked section of the ballot.

If you have questions, please contact Jennifer Bitz at jennb@aiche.org or Jing Chen at jingc@aiche.org.

All ballots must be submitted by no later than 11:59 PM (EST) on Friday, November 1, 2024, so that they may be counted.

2025 CCPS Project Proposal Listing:

Sprint Projects – (Yes/No Projects):

Proposal #	Title
2025-S1	Journey to Implementing Risk Based Process Safety – First Steps
2025-S2	Competency Development Planning for Process Safety Practitioners and Process Safety Line Managers
2025-S3	Addressing High Consequence Low Probability Scenarios within a Risk Based Process Safety Framework
2025-S4	Talking Process Safety / Warning Signs to Frontline Workers
2025-S5	Influencing Senior Leaders in Support of Process Safety
2025-S6	Process Safety Field Guide for Leaders
2025-S7	Achieving Enterprise-Wide Consistency in Process Safety (Revote)

2025 Project Proposals – (Full Projects):

Proposal #	Title
2501F	Guidelines for Technical Planning for Emergencies, 2nd Edition (Revote)
2502F	Guidelines for Hazard Evaluation Procedures 4th Edition
2503F	CCPS Guidelines for Planning and Executing Turnarounds and Major Maintenance Activities

2025 CCPS Project Ballot

Proposal No.: **2025-S1**

Title: **Journey to Implementing Risk Based Process Safety – First Steps**

Proposal: Create a monograph providing guidance for process safety professionals and others who are new to Risk Based Process Safety (RBPS) and/or are just starting to implement RBPS in their workplace.

Benefits: This monograph will help engineers and process safety professionals begin their process safety journey starting from little or no process safety system experience. The document will include guidance for developing and implementing some recommended first key management systems, to begin the journey to RBPS.

This monograph follows the framework of the CCPS RBPS management system. Some elements suggested for developing, implementing, or updating in the beginning are (to be confirmed by the project team):

Process Safety Competence, Hazard Identification and Risk Analysis (HIRA), Process Knowledge Management, Operating Procedures, Training and Performance Assurance, Management of Change (MOC), Incident Investigation, Asset Integrity

The monograph will include guidance on how to start the discussion about process safety risk management and how to gain leadership support for the first steps on the RBPS journey. It will include questions to ask and references to guide the RBPS champion through the first steps.

Team Composition:

Industry members from various industry sectors – at least one with a mature RBPS system and one newer to RBPS; member(s) from industry(ies) outside petrochemical (i.e. mining, food/pharma); members from PS Consulting companies as needed

Product: A monograph

Recommended Development Approach: A sprint project approach.

Audience: Engineers, scientists, managers that are new to working in high hazard industries.
Process Safety Professionals and other engineers interested new to the RBPS approach
Process Safety Professionals and other engineers in industries outside petrochemical

Time: 6 – 12 months for outline development and writing

Cost Recovery Potential:

Sponsor:

Champion: Jennifer Bitz, CCPS Lead Process Safety Engineer

Potential Reference Materials:

Guidelines for Risk Based Process Safety, published 2007; Vision 20/20 Online Self-assessment Tool; RBPS Self-Assessment checklist

Return to Full Project List

2025 CCPS Project Ballot

Proposal No.: **2025-S2**
Title: **Competency Development Planning for PS Practitioners and PS Line Managers**

Proposal: Create a monograph providing guidance for leaders, especially those who are **non**-Process Safety Professionals, in developing competency in the Process Safety Professionals they manage.

Benefits: Developing and maintaining process safety competency encompasses three interrelated actions: continuously improving knowledge and competency, ensuring that appropriate information is available to people who need it, and consistently applying what has been learned.

In many instances, Process Safety Professionals are managed by Process Engineers, other discipline engineers, EHS professionals, and even non-technical professionals. It can be challenging for non-Process Safety Professionals to know how to support building process safety competency as this is not their area of expertise. While aimed at non-Process Safety Professionals, this monograph will also guide Process Safety Professionals in supporting process safety competence development.

This monograph will be developed as a "How-To Guide" for the *Guidelines for Defining Process Safety Competency Requirements, 1st Edition*, which describes process safety roles and competency needs. It will answer the questions:

- What competency is needed.
- Why is that competency important.
- How might that competency be acquired.

The *Guidelines* includes a matrix relating process safety knowledge and expertise versus a desired competency. The matrix includes references for potential training, both company-internal and externally available. The *Guidelines* also includes guidance on how to conduct competency assessments and developing closure plans.

This monograph will include guidance on the following:

- Non-technical competencies (e.g. Communication and facilitation)
- Experiential learning (e.g. conferences, networking)
- Mentoring for PS technical competencies (both internal and external sources)
- Industry support for process safety competence development
- Certification

Team Composition:

Industry members from various industry sectors, perhaps those with experience in competency and training development; members from PS Consulting companies as needed

Product: A monograph

Recommended Development Approach:

A sprint project approach.

Audience: Engineers and scientists that are new to working in high hazard industries. Occupational Safety professionals taking on Process Safety responsibilities.
Process Safety Professionals and their managers

Time: 6 – 12 months for outline development and writing

Cost Recovery Potential:

Sponsor:

Champion: Cheryl Grounds, CCPS Emeritus; Jennifer Bitz, CCPS Lead Process Safety Engineer

Potential Reference Materials:

Guidelines for Defining Process Safety Competency Requirements, 1st Edition, 2015

Return to Full Project List

2025 CCPS Project Ballot

Proposal No.: **2025-S3**

Title: **Addressing High Consequence Low Probability Scenarios within a Risk Based Process Safety Framework**

Proposal: Produce a book describing methods that organizations could apply to minimize the occurrence of High Consequence Low Probability events.

Benefits:

As organizations work to best manage Process Safety risks, while working towards a vision of a world without Process Safety incidents, it is critical that the occurrence of events associated with High Consequences are the first to be eliminated. High Consequence, Low Probability Scenarios (HCLPs) can be much more difficult to manage when compared to other Process Safety risks, making the elimination of this class of events even more difficult to achieve. Further, HCLPs also are likely to result in potential reputational and financial solvency issues which may further impact the organization beyond the actual event, creating an additional driver for their elimination.

The low probability nature of these events makes assessing the true likelihood of these scenarios difficult to determine, as there are often few examples of actual occurrences to draw upon to establish a frequency. Further, the high consequence nature of these events often results in the need for a greater number of safeguards, the effectiveness of these safeguards along with the need for these safeguards to work in combination also introduces uncertainties into the risk assessment process. Lastly, safety culture can become a common cause failure mechanism which can lead to the degradation of multiple, including independent, safeguards, making the realization of these events more likely than expected in some cases. As such, working within a risk-based framework, extra steps may be necessary to successfully manage HCLPs relative to other Process Safety scenarios.

In addition to the safety culture issues associated with potential common cause failures, other culture issues can also play a role in making HCPLs more difficult to risk assess and manage. For example, the low probability of occurrence can create a climate where the possibility of an occurrence can be dismissed or downplayed, as the event has not (yet) been experienced by those in a position to address the scenario and/or assess the scenario. It can also create an environment, particularly when applying less quantitative assessment tools, where things like the absence of observations of the event over the short term can be inadvertently used to skew an assessment and imply that the event can't occur. This absence of events can also diminish the sense of vulnerability needed to address a risk, and negative feedback loops can be created whereby short-term success can be achieved through ignoring a risk. Further, when assessing HCLPs, the high consequence aspect can also be downplayed, as often secondary and domino scenarios are neglected or deemed not credible within the risk assessment process, and yet industry experience has demonstrated that secondary impacts to groups like first responders can readily and do unfortunately occur resulting in consequences which may be greater than those which were assessed.

There are also limitations in assessing low probability events in that randomness rather than statistical averages will dominate the observed frequencies. Although many risk assessments account for the uncertainty in the source frequencies and consequences used when completing a risk assessment, the randomness associated with the occurrence of adverse outcomes is often overlooked. As such,

adjustments to traditional risk assessment equations may be justified so as to provide further confidence that these low probability scenarios are confidently managed. In addition, game theory would indicate that the occurrence of some events is realistic unlikely to occur.

This monograph will look at a series of strategies that can be employed so as to help ensure that HCLPs are best managed and ideally that their occurrences are eliminated and/or reduced to a level that is as low as reasonably possible.

These strategies could include:

- Methodologies for accounting for uncertainties within risk assessments
- Inherent Safety and design philosophies
- Strategies for addressing culture issues
- Application of ALARP and best practices
- Common cause failure modes such as Human Factors and/or Safety Culture issues which can create large deltas between observed and calculated likelihoods
- Assurance processes to provide greater oversight and confidence that HCLPs are well managed
- Targeted Safety Culture approaches to maintain visibility and a sense of vulnerability as associated with potential HCLPs

Team Composition: Industry members from various industry sectors with experience in addressing HCLPs.

Product: A book that would assist organizations in developing approaches to that would ideally lead to the elimination of HCLPs.

Recommended Development Approach: Standard project committee

Audience: Global and regional Process Safety professionals

Time: 18-24 months for outline development and writing

Cost Recovery Potential: Sales

Sponsor:

Champion: Fred Henselwood, NOVA Chemicals

Potential Reference Materials: Existing Member Company Standards and Experiences

Return to Full Project List

2025 CCPS Project Ballot

Proposal No.: **2025-S4**

Title: **Talking Process Safety / Warning Signs to Frontline Workers**

Proposal: Imparting process safety "knowledge" to frontline workers in a meaningful manner is critical to improved process safety performance; unfortunately, a lot of process safety "content" is geared towards technical/engineering roles and management, not frontline workers. This project will be an on-going activity that will periodically (e.g., every quarter) issue a short focused document (e.g., 1 sheet, front and back) that explains a critical process-safety related topic in a manner that has meaning for frontline workers. Emphasis is on how the topic relates to the frontline worker, the worker's role regarding that topic, and the potential "warning signs" associated with the topic. The document will be editable to provide the basic template and guidance but can be revised to match a company's or site's terminology (e.g., changing "safeguards" to "barriers"). [Note: This project does not duplicate the Beacon, which is intended to provide general awareness of issues based on incidents. This project is intended to convert relevant CCPS "content" to a format that has meaning for frontline workers.] Example topics could include specific types of barriers/safeguards, risk, management of change, PHAs, specific hazards, operating limits, etc.

Benefits: This tool "translates" process safety concepts, topics, and warning signs into a format that is meaningful to and useable frontline workers.

Team Composition: Industry members with a background in operations, communication experts.

Product: This project is to be an on-going activity that will periodically (e.g., every two months) issue a short focused document (e.g., 1 sheet, front and back). The product could be used as the basis for short training courses or as a "shift change", "toolbox", or safety meeting topic or similar. Product could be translated into other languages.

Recommended Development Approach: Sprint Project to First Topic

Audience: Process operators, maintenance mechanics, instrumentation/PCS technicians, field workers, machine operators, etc.

Time: 6 - 12 months for development and writing first set of topics.

Cost Recovery Potential: **(**?)

Sponsor: (?)

Champion: (?)

Potential Reference Materials: *Risk Based Process Safety* published March 2007, *Process Safety Leadership from the Boardroom to the Frontline* published May 2019, online Safe Work Practices, Golden Rules, other CCPS books and publications, IOGP Process Safety Fundamentals

Return to Full Project List

2025 CCPS Project Ballot

Proposal No.: **2025-S5**
Title: **Influencing Senior Leaders in Support of Process Safety**

Proposal: Produce a monograph describing the best ways to influence Senior Leaders to gain their support for process safety with the limited time that process safety leaders have in front of these leaders (i.e. the thirty minutes per year that a PS leader has with the CEO).

This monograph will "provide consistent language for successful engagement on process safety matters for the non-technical senior leaders" (IOGP, 2024), especially regarding the senior leader's role and support needed. It will provide recommended metrics that process safety leaders can use to communicate the status of the process safety management program and to support the requests being made of senior management. The monograph will also cover key topics that should be communicated to senior leaders (regulation changes, best practices, high consequence scenarios, etc.)

Benefits: The resource will provide a short but effective template for process safety leaders to influence senior leaders to make informed decisions regarding process safety management.

Team Composition: Industry members from various industry sectors, with a wide knowledge of managing PS.

Product: A monograph explaining the need, benefits and methods of influencing Senior Leaders in support of Process Safety programs. Possible appendix to include Agenda for meeting with Sr. Leaders.

Recommended Development Approach: Sprint project committee

Audience: Process Safety professionals

Time: 8-12 months for outline development and writing

Cost Recovery Potential: Good-will
Sponsor:
Champion: Gregg Kiihne, BASF
Potential Reference Materials: Field Guide for Leaders (on 2025 ballot), Competency Development Guide for PS Practitioners and PS Line Manager (on 2025 ballot); The Business Case for Process Safety, CCPS 2018, Impact of Financial Decisions on Process Safety Monograph

Works Cited

IOGP. (2024). *Terms of Reference: Process Safety for Leadership.* International Association of Oil and Gas Producers (IOGP).

Return to Full Project List

2025 CCPS Project Ballot

Proposal No.: **2025-S6**

Title: **Process Safety Field Guide for Leaders**

Proposal: Senior Leaders often make plant visits because they are expected to do so. Once there, they are given a parade route tour of the cleanest parts of the plant and told about the successes over the last few years. They leave feeling good, but having accomplished little.

The basic concept is to tell leaders that they don't need to fear plant visits, and they don't need to try to be a process safety expert. The purpose of their visit is to ask questions to engage the employees and learn about the issues and challenges, not to be the expert. Ask about the biggest hazards, where the next incident might be, show me the best and worst parts of the plant.

The purpose of this guide is to equip leaders to make effective use of field visits to engage with workers, to understand the challenges they face to do their work successfully, and finally to follow-up in a way that makes a meaningful impact on the organization. This monograph will address the purpose of senior leader field visits and provide tactics, tools and templates to facilitate impactful, low-stress field visits.

Benefits: More effective connection between Senior Leaders and their people in the operating units leading to more highly engaged employees and improved issue resolution.

Team Composition:

Industry members from various industry sectors.

Product: *A monograph with appendices, as needed to include tools*

Recommended Development Approach:

A sprint project approach.

Audience: Senior Leaders in operating companies

Time: *6 – 12 months for outline development and writing*

Cost Recovery Potential: Goodwill

Sponsor:

Champion: Gregg Kiihne

Potential Reference Materials:

Return to Full Project List

2025 CCPS Project Ballot

Proposal No.: **2025-S7**

Title: **Achieving Enterprise-Wide Consistency in Process Safety**

Proposal: Produce a monograph describing the impact of enterprise-wide process safety inconsistency as well as methods of ensuring consistent Process Safety results among facilities, divisions, and subsidiaries.

Benefits: Domestic and global companies usually have multiple facilities, divisions and/or subsidiaries, at which the Principals and Elements of process safety are used to manage the risk of process safety incidents. The associated management systems often originated in a number of ways, such as company-wide requirements, facility-led initiatives, requirements obtained through acquisitions/mergers, and others. In addition, individual risk perception differences among those assessing risk can lead to differences in activities, actions, and even perception of risk between facilities or groups of facilities. Elements of process safety with the same point of origin may be implemented differently at each facility. Over time, it is not unusual for facilities to drift away from established centerline practices, perhaps even in different directions.

The results of these differences can lead to inconsistency in residual or "accepted" risk. The estimated severity of similar events among several facilities may be understood and documented differently. The number and types of safeguards and/or Layers of Protection employed may be different for very similar processes at different facilities. Other practices may vary from site to site, such as line breaking practices, MOC approval levels, and sources of RAGAGEP. These and other inconsistencies can leave one facility more vulnerable than another, or lead to poor distribution of resources, e.g. risk reduction beyond the needed level at one site and/or not enough at another.

This monograph will provide methods of achieving consistency in process safety results across the enterprise. Also included will be techniques to monitor and maintain consistency.

Team Composition: Industry members from various industry sectors, with a wide knowledge of PS Management. SMEs in specific elements of PS. Individuals experienced in benchmarking practices between entities.

Product: A resource explaining the need, benefits and methods of achieving consistency.

Recommended Development Approach: Sprint project committee

Audience: Global and regional Process Safety professionals

Time: 8-12 months for outline development and writing

Cost Recovery Potential: Good-will

Sponsor:

Champion: John Wincek, DEKRA Process Safety

Potential Reference Materials: Existing Member Company Standards

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2025 CCPS Project Ballot

Proposal No.: **2401F**

Title: "Guidelines for Technical Planning for Emergencies, 2nd Edition"

Proposal: Update "Guidelines for Technical Planning for On-Site Emergencies, 1st Edition", 1995.

Benefits: Effective planning for and response to industrial emergencies can save lives, minimize environmental impacts, and reduce financial and reputational impacts on the company experiencing the emergency. We have learned, through recent incidents, that some emergency response requirements may be beyond a company's capability making coordination, cooperation, and communication essential.

The 1st edition addresses the four main topics of prevention, preparedness, response and recovery. There have been numerous changes in these topics since 1995. This proposed revision will maintain the focus on these four topics while bringing the material up to date.

Proposed revisions include, but are not limited to, the following.

- Deletion of the term "on-site" from the title to clarify the scope is emergencies arising from an on-site incident that may have both on-site and off-site impact.
- Inclusion of and updating of the material currently in the "Assessment of and Planning for Natural Disasters" monograph issued in 2019.
- Expansion of concepts from the Federal Emergency Management Agency (FEMA) National Incident Management System, 2004, as relates to coordinating with local responders and Incident Command Systems.
- Addressing advances in alarm, alerting, and emergency response communication systems.
- Broadening the audience to include smaller, more remote sites that may not have fully equipped, onsite response teams.
- Expansion beyond the current US centric content.
- Inclusion of current practices relating to environmental justice aspects of industrial emergencies.
- Learnings from major seminal emergency response efforts including, but not limited to, the West, Texas Fertilizer explosion and the Arkema fire following hurricane Harvey.

Team Composition: CCPS members with industrial emergency response experience and industrial fire fighters.

Product: A guideline book.

Recommended Development Approach: The traditional CCPS Guideline book process.

Audience: Those involved in emergency preparedness and response. There will be a specific focus on making this book known to and accessible to emergency responders.

Time: 12-18 months

Cost Recovery Potential: Book Sales

Champions: Cheryl Grounds, Samantha Scruggs, Todd Aukerman

Potential Reference Materials:

- CSB Videos and CSB investigation reports
- "Guidelines for Technical Planning for On-Site Emergencies, 1st Edition", 1995
- "Assessment of and Planning for Natural Disasters", 2019
- FEMA, National Incident Management System, 2004

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2025 CCPS Project Ballot

Proposal No.: **2502F**

Title: Guidelines for Hazard Evaluation Procedures 4th Edition

Proposal: Update "Guidelines for Hazard Evaluation Procedures 3rd Edition" 2008.

Benefits: Effective hazard evaluation plays a crucial role in maintaining workplace safety and preventing work-related illnesses and injuries. The book "Guidelines for Hazard Evaluation Procedures, 3rd Edition" provides process engineers with effective methodologies to identify process hazards. It includes worked examples, reference, and updated information, making it a valuable resource. Since its publication in 2008, there have been advancements in topics such as Combustible Dust PHA, Cyber PHA, and Safer Technology Alternatives Assessment (STAA). In addition, prompted by COVID-19 and the use of global work teams, more PHAs are being conducted remotely. Updating this book would ensure that it remains relevant and comprehensive in addressing modern safety challenges.

Proposed revisions include, but are not limited to, the following.

- Incorporation of guidance on how to effectively conduct hazard evaluations remotely.
- Provide content on performing a Combustible Dust PHA.
- Include content on how to conduct a Cyber PHA, referencing the CCPS book material.
- Include content on Safer Technology Alternatives Assessment (STAA) – reference to future monograph.
- Include guidance related to including consideration of the risk of natural hazards and climate change and power loss in PHAs.
- Include guidance related to assessing the need for emergency block valves.
- Provide guidance on how to organize, access, and manage Process Safety Information.
- Update references, such as to the NOAA compatibility chart tool.
- Upgrade the quality of some graphics.
- Remove obsoleted content (e.g. reference to Dow F&IE, CEI).

Team Composition: CCPS members with experience in hazard evaluation.

Product: An updated guideline book.

Recommended Development Approach: The traditional CCPS Guideline book process.

Audience: All process safety professionals who conduct hazard evaluation as part of their responsibilities, as well as managers of those professionals who would like to gain an appreciation of the tools available to hazard evaluation practitioners.

Time: 12-18 months

Cost Recovery Potential: Book Sales

Champions: TBD

Potential Reference Materials:

- CSB Videos and CSB investigation reports
- Future monograph – Safer Technologies and Alternatives Analysis
- "Managing Cybersecurity in the Process Industries: A Risk-Based Approach"
- US EPA RMP guidance on evaluating natural hazards and STAA

Return to Full Project List

2025 CCPS Project Ballot

Proposal No.: **2503F**

Title: **CCPS Guidelines for Planning and Executing Turnarounds and Major Maintenance Activities**

Proposal: Produce a book describing methods that organizations could apply to help plan and execute Turnarounds and Major Maintenance activities to minimize the likelihood of Process Safety related risks from occurring.

Benefits:

Turnarounds and Major Maintenance activities represent periods of significant and different work within processing facilities. Further, these activities can be associated with major changes in chemical inventories, the use of temporary equipment and by-passes, the management of significant facility changes, and the need to safely shutdown and restart the facility. Further, during these activities, there are additional Process Safety challenges with issues like simultaneous operations, temporary workforces, abnormal facility conditions, and the disposal, cleaning, and storing of temporary inventories of potentially hazardous materials. This guideline book would look at how the different phases of Turnarounds and Major Maintenance activities need to be planned so they can be safely managed. Incidents such as Pasadena and Texas City demonstrate what can happen if issues arise during restarting a facility after turnarounds and major maintenance.

Before a turnaround, facilities need to engage in numerous planning activities and pre-turnaround work to ensure the safe execution of an outage. This can include topics such as:

- Temporary workforce requirements
- Siting of temporary buildings and portable structures and potential changes in occupancies to existing buildings
- Maintenance and inspection task planning
- Engineering work needing to be completed
- Building of scaffolding and other preparation work

At the initiation of the turnaround, there will be a new series of activities to be safely conducted:

- Shutting down the involved portion of the facility
- Potentially de-inventorying of the equipment
- Changes in practices such as electrical area classification, gas testing, and building occupancies

During the turnaround, the focus then shifts to managing work:

- Simultaneous Operations
- Testing of Safety Instrumented Systems and other Process Safety related safeguards
- Management of Change and Pre-Startup Safety Reviews
- Quality Control issues associated with activities such as bolting and system closure
- Potential facility expansion and/or debottlenecking activities

Finally, the facility needs to be restarted safely:

- Re-inventorying equipment
- Removal of temporary equipment and buildings

- Incorporating facility changes into operating practices
- Returning to stable operations

This text will help identify key stages, programs, and risks so as to help facilities better plan, manage, and execute turnarounds and major maintenance safely and return the facility to operation.

This book will also cover emerging technologies and how these technologies can support these activities and reshape how this type of work is completed in the future.

Team Composition: Industry members from various industry sectors with experience in managing turnarounds.

Product: A book that would assist organizations in planning and executing turnarounds and major maintenance safely.

Recommended Development Approach: Standard project committee

Audience: Global and regional Process Safety professionals

Time: 18-24 months for outline development and writing

Cost Recovery Potential: Sales

Champion: Fred Henselwood, NOVA Chemicals

Potential Reference Materials: Existing Member Company Standards and Experiences; Guidelines for Preparing Process Equipment for Maintenance and Return to Service (current project 314)

Return to Full Project List

Enhancing Operational Discipline to Support Process Safety.

Nathan Phillips

9th CCPS Canadian Regional Meeting
September 10th, 2024

Agenda.

- Introductions & Overview
- The Skills Gap & Human Error
- Challenges for Process Safety
- Demo
- Q&A

Introductions & Overview

Introductions.

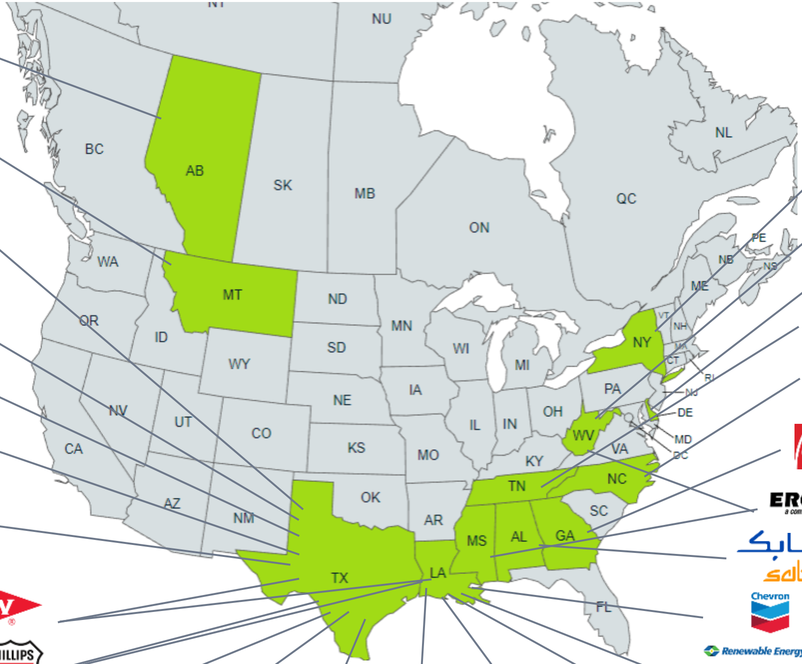
Nathan Phillips

Sales Director for Voovio Canada. Previously spent >10 years working in Operational, Technical, and Sales roles. Based in Calgary.

Adam Teeter

Sales Executive for Voovio Canada. Previously spent >20 years working in Operational, and Sales roles. Based in Calgary.

Who we are.



SUNCOR ENERGY
CALUMET SPECIALTY PRODUCTS PARTNERS, L.P.
Formosa Plastics
TESLA
Linde
lyondellbasell
covestro
DOW
PHILLIPS 66
HALLIBURTON
kuraray
LBC TANK TERMINALS
Westlake
SHINTECH
BASF We create chemistry
LION ELASTOMERS
Renewable Energy Group
Chevron
sabic
ERGON a company that works
OWENS CORNING
FIBER INDUSTRIES
EASTMAN
CRODA
Celanese
plug

ALBEMARLE
Climax Molybdenum
BASF We create chemistry
Westlake Vinnolit
Borouge
HALLIBURTON

People Focused.

An AIChE Technology Alliance

CCPS

Center for Chemical Process Safety

"A World without Process Safety Incidents."

voovio

Enhancing human performance to improve overall workforce effectiveness.

Enhancing Human Performance.

OWE Overall Workforce Effectiveness: Reliability, Productivity, Availability

The Skills Gap & Human Error

The Skills Gap.

Recent Headlines:

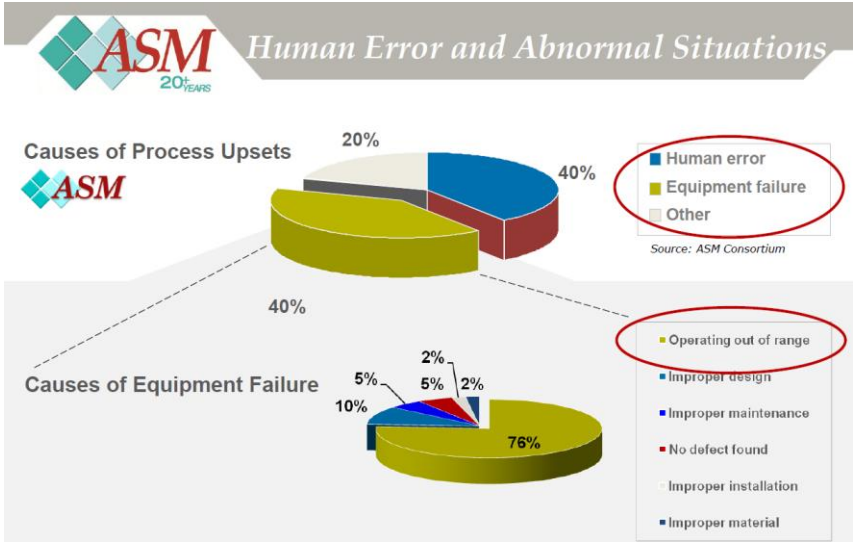
- **600,000 vacant positions** in industry right now with another **3.8 million jobs expected to be needed by 2033** (Caldwell, 2024)
- As manufacturers try to address the **severe talent gap** challenging the industry, many also recognize **the time has come to elevate it as a strategic priority** (Caldwell, 2024)
- A CFIB report found that small Canadian firms lost $38 billion in business opportunities due to labor shortages in 2022 (CFIB, 2023)
- Nate Horner (Alberta MLA) said that projects such as Dow's $9-billion petrochemicals project in Fort Saskatchewan, *"have the potential to completely drain the province of certain types of skilled labour."*

"People are the lifeblood of any Business"

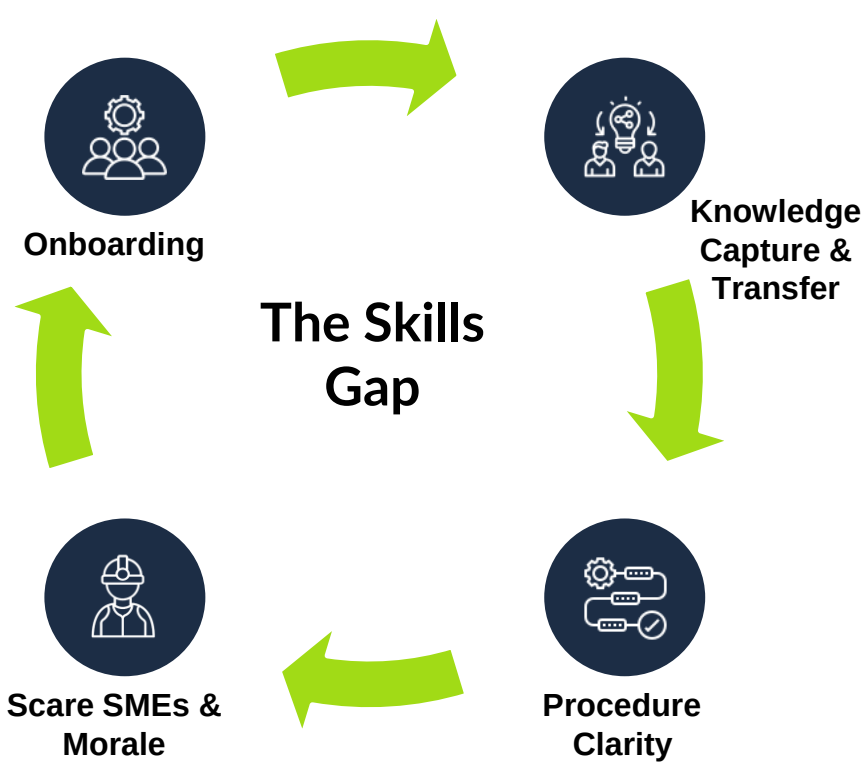
Human Error.

What do we know:

- The abnormal situation management consortium (ASMC) found that more than 70% of process upsets are due to human error (Morse & Ogden-Swift, 2014)
- A study conducted by the Center for Chemical Process Safety (CCPS) found that approx. 75% of safety incidents in the chemical industry were caused by human error
- According to the ASMC the causes of abnormal events are:
    - The procedure was not followed, 51%
    - Procedure was wrong, 40%
    - Procedure followed incorrectly, 6%



A Perfect Storm.



The Skills Gap is magnifying the Impacts of Human Error

Challenges for Process Safety

Procedure Clarity.

- Clear and concise actions
- Ability to visualize procedure steps in the field
- Ability to practice standardized execution (*learn by doing*)

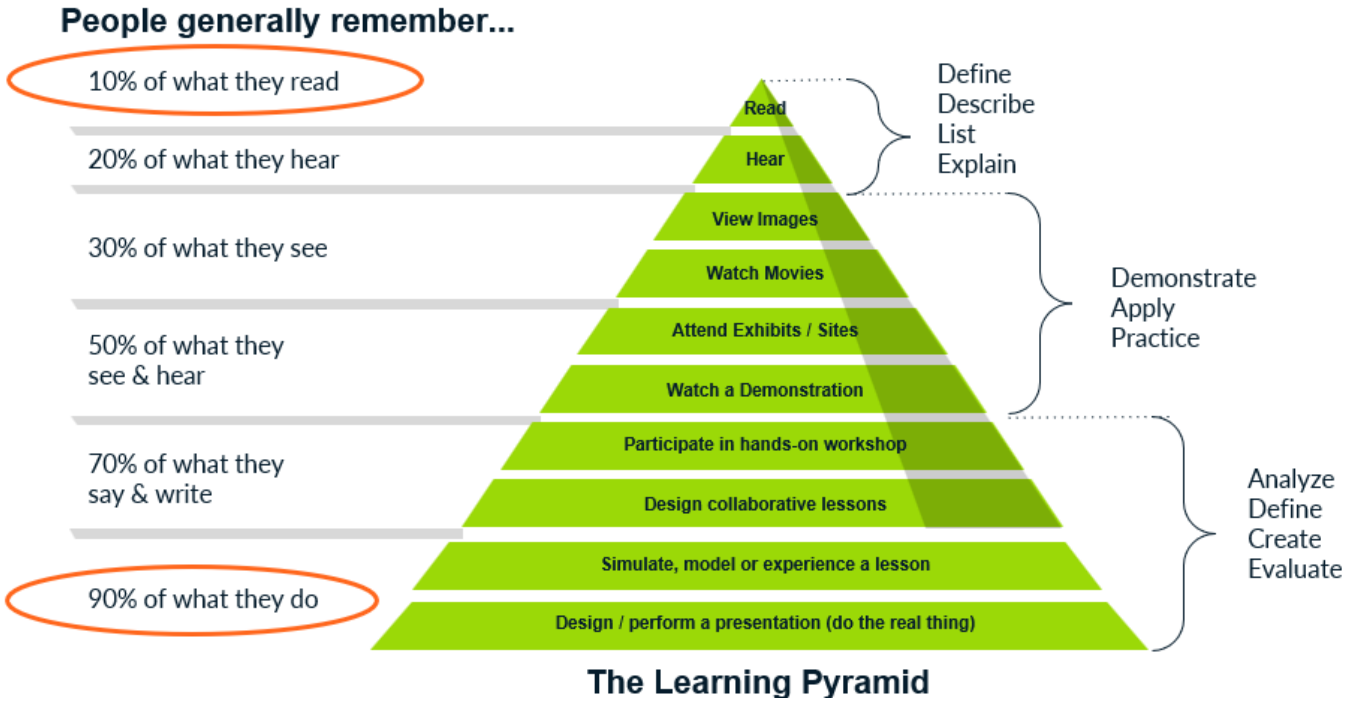
Procedure Clarity.

1 Step → **10 Actions**

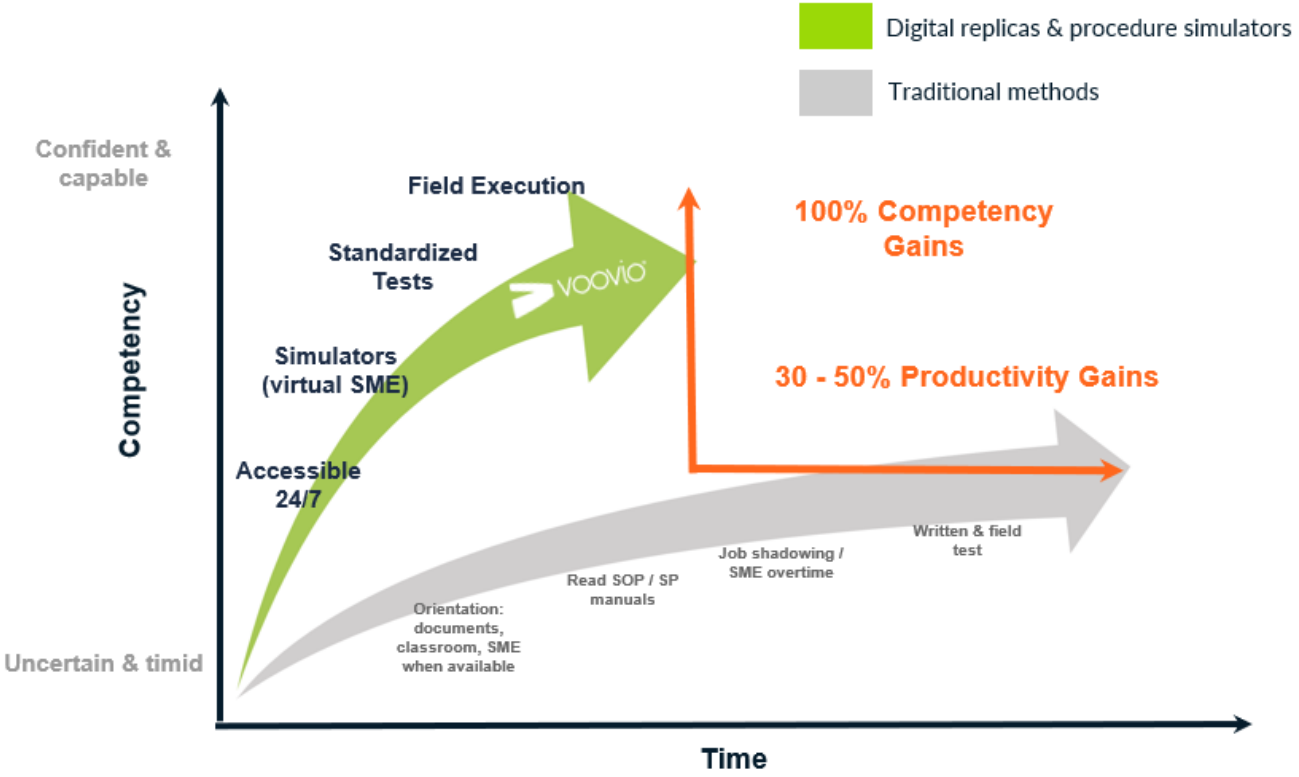
2.3 *Open the non-instrumented fuel gas cock valves and air dampers.*

- Interacting with 5 air dampers
- Actuating 5 fuel gas valves

Onboarding.

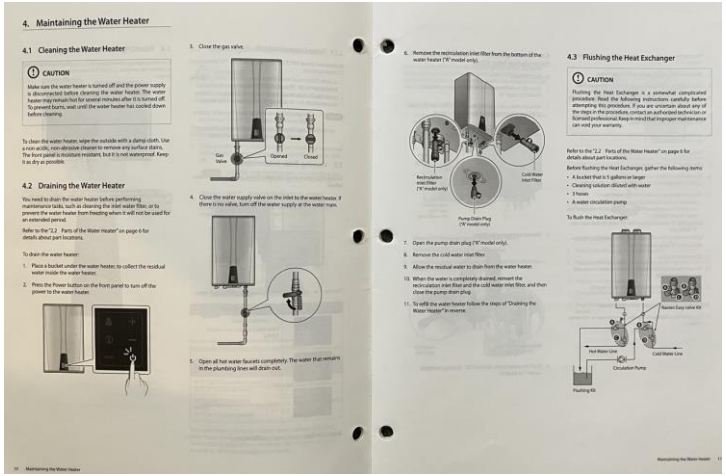

People generally remember...
10% of what they read
20% of what they hear
30% of what they see
50% of what they see & hear
70% of what they say & write
90% of what they do
Read
Hear
View Images
Watch Movies
Attend Exhibits / Sites
Watch a Demonstration
Participate in hands-on workshop
Design collaborative lessons
Simulate, model or experience a lesson
Design / perform a presentation (do the real thing)
Define
Describe
List
Explain
Demonstrate
Apply
Practice
Analyze
Define
Create
Evaluate
The Learning Pyramid

Onboarding.


Digital replicas & procedure simulators
Traditional methods
Confident &
capable
Competency
Uncertain & timid
Field Execution
Standardized
Tests
Simulators
(virtual SME)
Accessible
24/7
VOOVIO
100% Competency
Gains
30 - 50% Productivity Gains
Orientation:
documents,
classroom, SME
when available
Read SOP / SP
manuals
Job shadowing /
SME overtime
Written & field
test
Time

Knowledge Capture & Transfer.

Clean and Descale Navien Tankless Water Heater



Knowledge Transfer & Knowledge Capture are critical, but you can't transfer what you haven't captured

Scarce SMEs & Morale.

Impact on	Benefit	Time Required	
		Voovio	Traditional
Time to Competency	65% faster	3.30 hours	9.75 hours
SME Time	>73% reduction	2.25 hours	8.25 hours

- Controlled experiment at major Texas Petrochem facility with input from Rice university, Houston TX – June 2021.
- 24 operators, split into 2 groups, learned 2 SOPs in 2 days. No experience in that production unit prior to exercise.
- Traditional method: Classroom, Review P&IDs/SOP, Field Walkthrough
- Voovio method: Voovio Simulation, Field walkthrough

Immersive, Realistic Simulators with Expert Knowledge.

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Questions & Comments?

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