

# 2013 Training Catalog



**PROCESS IMPROVEMENT INSTITUTE**

Risk and Reliability Specialists

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[www.piii.com](http://www.piii.com)**

## **A Sample of what our attendees and clients say:**

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***Bill Bridges is an excellent instructor.***

**M. H. Lorigo, United Technologies Corporation**

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***Bill Bridges ...provided us with very valuable guidance and information that will allow us to develop a world-class incident investigation team and get closer to our goal of an injury-free environment.***

**Edith Wharton, Safety and Health, Weyerhaeuser Paper Company**

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***PII provides outstanding process safety and loss control training and consulting services. I have worked extensively with Bill Bridges and his colleagues for years, and have found their expertise and standard of care to be second to none. They have customized training for CCP and have provided hands-on help with PHAs (HAZOPs), PHA revalidations, and continual improvement with PSM. One aspect of PII that we greatly appreciate is that they do not charge additional licensing fees (as others do) for use of and training with standard industry methods such as Root Cause Analysis. PII is considered part of our team at CCP. We highly recommend PII."***

**Michael Gromacki, Vice President  
Engineering and Loss Control  
Cook Composites and Polymers Co. (CCP)**

## 2013 PII Course Calendar

Rev 5

Course Title	Fees/Duration	Jan. '13	Feb. '13	Mar. '13	Apr. '13	May '13	June '13	July '13	Aug. '13	Sept. '13	Oct. '13	Nov. '13	Dec. '13
<b>Course 1</b> <b>Overview of Process Safety Management (PSM)</b> – reviews all 14 elements of PSM as defined in US OSHA 29 CFR 1910.119. Excellent for workers	1 day	(only offered as a private course at client site)											
<b>Course 2</b> <b>Process Safety Management (PSM)</b> – detailed description of each PSM element and how these interrelate. Some exercises and many examples. Great starter for PSM implementers	\$1095 – 3 days, in USA  \$1995 - 3 days, in Dubai [UAE] or Bahrain		3-5 Dubai  11-13 Char.		8-10 Char.		24-26 Char.			9-11 Char.		10-12 Dubai  11-13 Char.	
<b>Course 3</b> <b>Compliance Auditing for Process Safety</b> – details of how to perform an audit (gathering & analyzing data, generation of findings, etc.)	\$795 – 2 days		6-7 Dubai  14-15 Char.							12-13 Char.		13-14 Dubai	
<b>Course 4</b> <b>Incident Investigation/Root Cause Analysis Leadership</b> – In-depth explanation and hands-on workshops for perspective investigators/ analysts, cover all aspects and all activities. Uses the best practices from industry	\$1045 – 3 days, in USA  \$1995 - 3 days, in Dubai [UAE] or Bahrain		27- Mar 1 Napa				4-6 Dubai  19-21 Char.				9-11 Char.		4-6 Napa
<b>Course 4-0</b> <b>Incident Investigation/Root Cause Analysis Overview</b> – overview for workers or management who may participate in investigations	1 day	(only offered as a private course at client site)											
<b>Course 5</b> <b>Writing Effective Operating and Maintenance Procedures</b> – following the rules taught in this course will prevent human error. This course is designed for writers (operators, maintenance workers, etc.)	\$795 – 2 days, in USA  \$1495 - 2 days, in Dubai [UAE] or Bahrain						9-10 Dubai		5-6 Knox.				
<b>Course 6</b> <b>Mechanical Integrity</b> – explains how to comply with the MI requirements within PSM, as well as how to mesh MI with reliability. Many workshops	\$795 – 2 days, in USA  \$1495 - 2 days, in Dubai [UAE] or Bahrain								7-8 Knox.				

Course Title	Fees/Duration	Jan. '13	Feb. '13	Mar. '13	Apr. '13	May '13	June '13	July '13	Aug. '13	Sept. '13	Oct. '13	Nov. '13	Dec. '13
<b>Course 7</b> <b>Management of Change and PSSR</b> – In-depth explanation and workshops on how to manage changes to procedures, equipment, etc., including how to do simple hazard reviews and explains pre-startup safety reviews	\$795 – 2 days, in USA  \$1495 - 2 days, in Dubai [UAE] or Bahrain				11-12 Char.		11-12 Dubai					14-15 Char.	
<b>Course 8</b> <b>PHA/HAZOP Leadership</b> – the best course on how to lead and scribe hazard evaluations; taught by experts who have led hundreds of PHAs. For people who will be leading/scribing	\$1695 – 4 days, in USA \$1995 – 5 days, in USA  \$2995 - 5 days, in Dubai [UAE] or Bahrain		25-Mar. 1 Char.			13-17 Char.  19-23 Dubai		22-26 Char.			21-25 Char.	3-7 Dubai	
<b>Course 8-0</b> <b>PHA/HAZOP Overview</b> – review of the requirements and methods. Ideal for managers or for team members	1 day	(only offered as a private course at client site)											
<b>Course 9</b> <b>PHA Revalidation</b> – best, proven methods for revalidating PHAs/ HAZOPs. For experienced PHA leaders	\$795 – 2 days, in USA  \$1495 - 2 days, in Dubai [UAE] or Bahrain						27-28 Char.						
<b>Course 10</b> <b>Human Error Prevention</b> – covers all of the reasons why human make mistakes and why they develop habits (good and bad) and explains how to optimize each factor to control human error	\$795 – 2 days, in USA  \$1495 - 2 days, in Dubai [UAE] or Bahrain		25-26 Napa				2-3 Dubai  17-18 Char.				7-8 Char.		2-3 Napa
<b>Course 11</b> <b>Layer of Protection Analysis (LOPA)</b> – thoroughly explains how to perform LOPA to judge risk and to determine the proper SIL. Taught by one of the 3 primary authors of the industry textbook on LOPA	\$795 – 2 days  \$1495 - 2 days, in Dubai [UAE] or Bahrain		11-12 Dubai	5-6 Knox.		26-27 Dubai				10-11 Knox.			9-10 Napa
<b>Course 12 - NEW</b> <b>Safety Instrumented Systems (SIS &amp; SIL)</b> – explains how to determine when a SIF is needed, determine the proper SIL, specify and design and SIS, verify the SIL, and install and maintain and validate the SIF/SIL. Taught by one of the developers of SIL verification standards.	\$795 – 2 days, in USA \$1495 - 2 days, in Dubai [UAE] or Bahrain		13-14 Dubai	7-8 Knox.		28-29 Dubai				12-13 Knox.			11-12 Napa
<b>Course 13</b> <b>Job Safety Analysis (JSA)</b> – detailed procedures and workshops to teach workers and supervisors how to perform JSAs	3.5 hours (2 sessions offered each day)	(only offered as a private course at client site)											

Course Title	Fees/Duration	Jan. '13	Feb. '13	Mar. '13	Apr. '13	May '13	June '13	July '13	Aug. '13	Sept. '13	Oct. '13	Nov. '13	Dec. '13
<b>Course 14</b> <b>Human Error Prevention - for Workers</b> – a customizable course to explain human errors to workers, with options to provide tools for controlling errors (such as JSA, STAR, etc.)	1-3 days, depending on needs	(only offered as a private course at client site)											
<b>Course 15</b> <b>Safety Task Action Reporting (STAR)</b> – workshops to teach workers how to control bad habits in the workplace	1 day - worker course 1-day - managers course	(only offered as a private course at client site)											
<b>Course 16</b> <b>Behavior-Based Management for Safety and Reliability (Behavior-Based Error Reduction)</b> – best practices from lessons learned in the past 20 years of implementing effective methods for controlling habits. Can include a module on implementing STAR	\$795 – 2 days, in USA  \$1495 - 2 days, in Dubai [UAE] or Bahrain	(only offered as a private course at client site)											
<b>Course 17</b> <b>Selecting the Right Manufacturing Improvement Tools</b> – Compares each of the latest approaches to reliability and manufacturing improvement, such as TMP, Six Sigma, Lean Manufacturing, RCA, Predictive Maintenance, Kaizen, etc.	1-2 days, depending on needs	(only offered as a private course at client site)											
<b>Course 18</b> <b>Reliability Leadership for Manufacturing Excellence</b> – Learn excellence in manufacturing practices that are patterned after the best-in-class manufacturing companies.	1-2 days, depending on needs	(only offered as a private course at client site)											

## Notes

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Schedules and course fees are subject to change. Except as indicated, all prices are for USA locations. [Knox = Knoxville](#). [Char = Charlotte, NC area](#). [San Fran = San Francisco Bay Area](#). [Dubai \[UAE\] or Bahrain](#)

For courses in [Oman](#), [Dubai \[UAE\]](#), [Bahrain](#), and [UK](#), special rates, discounts, and terms may apply; please follow the links for these locations to see full descriptions for these courses and to learn how to register for them.

All course fees are in US Dollars, except as otherwise indicated.

**Private (on-site) courses are usually less costly overall for class sizes larger than 6; these are normally priced per class-day with recommended class size limits. Call for details.**

## Registration Information

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Process Improvement Institute (PII) provides the best training in process safety and reliability. Our instructors have decades of experience and are the most experienced instructors in the world on the topics offered. They know what works in practice and are able to teach you this. And, our course design and materials have been through many iterations over the past 20 years as they were continually improved to meet the goals of our very demanding clients.

## Fees and Payments

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A 15 % discount is available for groups of 5 or more attendees registered for the same course from the same company. See course descriptions for information on discounts for taking two or more courses held during the same week.

Courses with software do not include software licenses; these require separate purchase and can be licensed after the course.

Fees quoted in this calendar are valid until PII's next training advertisement is issued. You may pay by check, VISA®, MasterCard®, American Express®, wire transfer, money order, or purchase order. (Make checks and money orders payable to Process Improvement Institute.) If you register by purchase order, we will invoice you immediately and payment is required before the start of class.

**If you are paying by check, send payments to the Process Improvement Institute, 1321 Waterside Lane, Knoxville, TN 37922.**

All course fees must be paid before the course begins. Course fees include all manuals, course materials, lunches, and refreshments throughout the day. Fees do not include accommodations or transportation; but we will send you information about local accommodations with your course confirmation.

Contact PII by phone at 1.865.675.3458 or by e-mail at [wbridges@piii.com](mailto:wbridges@piii.com) with any questions. To register, use the form on Page 31 of this catalog or you can register via our web site.

## Transfers and Cancellations

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Early registration helps ensure your place in our limited-enrollment courses. Registrants unable to attend a course may send a substitute, enroll in the next scheduled class, or request a refund up to 2 weeks before the class begins.

If it becomes necessary to change or cancel any course, PII will notify you at least 2 weeks before the course date. If a course is cancelled, PII will promptly refund your full tuition if you do not wish to transfer to one of the next offered courses. PII reserves the right to change the date or location of a course and to substitute instructors with equivalent qualifications if unforeseen circumstances arise. **We recommend you NOT make non-refundable travel plans until the course date has been confirmed to you by e-mail about 2 weeks ahead of the course start date.**

## **Course 1: Process Safety Management (1-Day)**

**Recommended prerequisites: None. However, either this course or Course 2 is a recommended before attending Courses 4 through 9 (on various PSM elements). For a more in depth study you should plan to attend Course 2.**

This course introduces the PSM architecture (written programs, roles and responsibilities, implementation including training, record keeping, and auditing). The course explores all 14 key elements (parts) of a comprehensive PSM program and how the overall architecture applies to each. Links between elements and integration with existing and sometimes overlapping current company policies (such as quality and reliability programs) are also discussed.

### ***Typical Course Candidates***

- Managers – Operations, Safety and Executive
- Engineers – Process, Safety and Mechanical
- PSM Implementation Team Members – Anyone involved with implementation including operators, maintenance personnel, and purchasing agents
- Compliance Auditors
- Environmental Management and Technicians

### ***What You Will Learn:***

- Basic performance-based requirements of PSM standards
- Jargon for communicating PSM requirements to others throughout the organization
- Specific guidelines for developing written programs tailored for each PSM element
- How to avoid costly implementation mistakes
- For each element
  - How to begin implementation at your company
  - Additional training necessary for implementation of specific elements

### ***Take Home:***

- Comprehensive course notebook containing
  - Sources of PSM information
  - Comprehensive list of key PSM performance indicators
- Certificate of Completion
- 0.8 CEUs & 0.8 COCs

## **Course Outline (1-day, 8:00 a.m. to 3:30 p.m.)**

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### **Introduction to PSM**

- Overview of PSM standards and regulations, summary, definitions, origins, goals

### **Elements of PSM:**

- Employee Participation
- Process Safety Information
- Operating Procedures
- Hot Work Permit/Safe Work Practices
- Training
- Contractors
- Process Hazard Analysis
- Management of Change
- Mechanical Integrity
- Pre-Startup Safety Review
- Emergency Planning and Response
- Incident Investigation
- Compliance Auditing
- Trade Secrets
- Management Commitment and Accountability

### **PSM programs – Developing, Implementing and Planning**

### **Overview of Key Performance Indicators (KPIs) for PSM elements**

## **More Information**

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### **Schedule:**

This course is only offered as a private offering at a client's site. Please contact PII for details about having our training provided at your site.



## Course 2: Process Safety Management (3-Day)

**Recommended prerequisites: None. However, this course is a recommended before attending Course 3: PSM Auditing.**

This course provides an in-depth study of each PSM element. The course introduces each PSM element and the specific guidelines for integrating PSM element requirements into other corporate programs and evaluating program compliance throughout the implementation phase.

Case Studies – Case studies and exercises are used throughout the course to illustrate interpretations of the requirements and demonstrate ways to develop an effective PSM program, including several video based case studies.

### ***Typical Course Candidates***

- Managers – Operations, Safety, and Executive
- Engineers – Process, Safety, and Mechanical
- PSM Implementation Team Members – Anyone involved with implementation, including operators and maintenance personnel
- Compliance Auditors
- Environmental Management and Technicians

### ***What You Will Learn:***

- To interpret the performance-based requirements of the U.S. OSHA PSM and EPA risk management standards, as well as learn about related industry standards
- The elements of process safety that are missing from typical PSM systems, including Human Factors elements (communication, human system interface, work environment, staffing, and fitness for duty), Facility Siting element, Project Risk Management, Senior Leadership & Accountability. The Risk-Based Process Safety (RBPS) guide (2007) from CCPS/AIChE is reviewed so you can understand how to close critical gaps
- Multiple options for implementing an effective need-specific program
- Specific guidelines for developing cost effective written programs tailored for each PSM element, whether for a single facility or a corporation
- How to avoid costly implementation mistakes
- Jargon for communicating PSM requirements to others throughout the organization
- For each element
  - How to develop written programs to meet PSM requirements
  - How to incorporate and integrate the PSM element requirements into other corporate programs (other corporate management systems)
  - Key performance indicators
  - How to evaluate program compliance throughout implementation
  - How to begin implementation at your company
  - Additional training necessary for implementation of specific elements
- The course uses actual and generic case studies, including several video-based case studies
  - To illustrate interpretations of PSM requirements
  - To demonstrate developing an effective PSM program that can be adapted for your facility

## **Take Home:**

- Comprehensive course notebook containing
  - Sources of PSM information, including examples of working PSM systems
  - Clarifications and interpretations of OSHA PSM standards
  - Comprehensive list of key PSM performance indicators and how to use them
- Certificate of Completion
- 2.1 CEUs & 2.1 COCs

## **Course Outline**

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### **Day 1 (8:00 a.m. - 5:00 p.m.)**

- Introduction to PSM and its origins and goals
- Overview of PSM standards and regulations world-wide, definitions, compliance interpretations
- Elements of PSM:
  - Human error basics
  - Elements missing from most PSM systems, including specific human factor aspects, management commitment & accountability, and project risk management
  - Employee participation
  - Trade secrets
  - Process safety information
  - Operating procedures

### **Day 2 (8:00 a.m. to 5:00 p.m.)**

- Elements of PSM (continued):
  - Hot work permit/safe work
  - Training
  - Contractors
  - Process hazard analysis
  - Management of change
  - Mechanical integrity
  - Pre-startup safety review

### **Day 3 (8:00 a.m. to 3:00 p.m.)**

- Elements of PSM (continued):
  - Emergency planning and response
  - Incident investigation
  - Compliance auditing
- Key Performance Indicators, Leading Indicators, and Tracking
- Summary of roles and responsibilities
- Developing PSM programs, implementation planning
- *Course examination (optional)*

## **Pricing for Public Offerings (per student):**

\$1095.00 USD

## **Course 3: Auditing for Process Safety/Risk Management (2-Day)**

**Recommended prerequisites: A thorough understanding of the PSM and RMP regulations; for a refresher course on PSM, see Course 1. Others should take Course 2 and apply PSM for at least one year before becoming a PSM/RMP auditor.**

This course covers every aspect of auditing from gathering data via records and interviews, keeping notes, report writing, and making recommendations. Using all rules and methods taught in class, the second day is a workshop to audit actual PSM practices in a real-time setting.

### ***Typical Course Candidates***

- PSM Implementation Team Members – Anyone involved with implementation, including
  - Managers – Operations, Safety, and Executive
  - Engineers – Process, Safety, and Mechanical
  - Environmental Management
- Compliance Auditors

### ***What You Will Learn:***

- Auditing fundamentals to help you structure effective PSM/RMP audits
- How to apply PSM and RMP compliance auditing to your system
- How to design audits that have dual purposes: verifying compliance with regulations and identifying weaknesses in the design and implementation of PSM/RMP programs
- How to properly document audit results for compliance and for internal purposes
- Extensive exercises and workshops are used to illustrate how to effectively perform each phase of a PSM audit
- Gain hands-on experience in:
  - Reviewing PSM/RMP programs in an audit team environment with real-time constraints and the need for team member consensus
  - Writing specific, concise audit findings and observations
  - Auditing techniques, including interviewing skills

### ***Take Home:***

- Comprehensive course notebook containing auditing tools and resources
- Electronic copies of audit tools, allowing audit checklist/protocol customizations
- Certificate of Completion
- 1.3 CEUs & 1.3 COCs

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

- Scope of the audit
- Audit techniques
- Gathering data from people – interviewing
- Keeping notes/records
- **Workshop: Interviewing**
- Gathering data from records – reviewing documentation
- Gathering data from field observations
- **Workshop: Gathering, cataloging, and judging data**
- The audit report
- The audit process – planning the audit
- Audit follow-up and tracking

### Day 2 (8:00 a.m. to 4:00 p.m.)

- Case Studies: Auditing the PSM/RMP system and its processes and products
  - Small teams will:
    - » Determine data needs
    - » Gather data (interview role-players, get data from company files, etc.)
    - » Use techniques taught in class to determine compliance with each element of PSM
    - » Judge compliance with your PSM standard
    - » Draft effective recommendations
  - Team presentations to class
- *Course examination (optional)*

### Pricing for Public Offerings (per student):

\$795.00 USD

## **Course 4: Incident Investigator/Root Cause Analyst Training (3-Day)**

**Recommended prerequisites:** Participants should have practical, technical experience in design, operation, or maintenance of complex systems. Individuals with good logic skills do best in this course. Course 10 is especially helpful, but not required.

This training teaches how to lead investigations and root cause analyses using various techniques such as Causal Factor Charting, Fault Tree Analysis and Root Cause Charts. This is a "How To" course designed to teach skills. An optional part of the course can include 1 to 2 hours of software instruction.

### ***Typical Course Candidates***

- Engineers – process, process safety, and mechanical
- Operations and Maintenance Staff
- Process reliability staff and process quality control/assurance staff

### ***You Will Learn:***

- How to meet regulatory requirements for incident investigations
- How to develop and implement a structured program
  - Designed for learning from incidents
  - Why and how to define misses
  - How to train others to recognize and report incidents
  - Includes planning for trending of data
- How to initiate and conduct an investigation
  - Establishing an effective team quickly and methods for collecting different types of data, including effective interviewing skills
- How and when to apply causal factor and root cause analysis for investigating process and non-process incidents
  - Includes event and condition charting (causal factor charting)
  - Filling data gaps using fault tree logic
  - "5-Whys" technique for finding root causes
  - PII's Root Cause Chart™ for categorizing root causes
- How to develop appropriate recommendations to address root causes at various levels and how to structure reports
- Via actual industry examples and workshops, learn key points and practice your new skills

### ***Take Home:***

- Comprehensive course notebook containing
  - Root Cause Chart™ , industry examples and solutions, and a 65-page Root Cause Analysis Guide on the use of the Root Cause Chart™
- Electronic (PDF) copy of course notebook, including the Toolkit , Root Cause Chart™, and Free Excel worksheet for documenting causal factor charts and fault trees
- Certificate of Completion and 2.0 CEUs & 2.0 COCs

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

- Basics of incidents and investigations
- **Workshop: Identifying near misses (near hits)**
- Initiating the investigation
- Gathering data
  - Basics
  - Gathering data from people
  - Gathering data from documentation, parts, and chemicals
- **Workshop: Identifying key data needs**
- Analyzing data for ALL causal factors
- **Workshop: Causal factor charting**

### Day 2 (8:00 a.m. to 5:00 p.m.)

- Bridging gaps in data
- **Workshop: Using fault tree analysis to find all possible scenarios and determine the most likely one**
- Determining ALL root causes of each causal factor
- **Workshop: Identifying root causes using the “Root Cause Chart” technique**
- Developing conclusions and recommendations
- **Workshop: Conclusions and recommendations based on facts**
- Overview of results trending
- Preparing for the Case Study

### Day 3 (8:00 a.m. to 3:30 p.m.)

- Case Study: Using all rules and methods taught in class to investigate actual incident in real-time setting. Small teams will:
  - Determine data needs
  - Gather data (interview role-players, get data from computer control systems, etc.)
  - Use causal factor charting and fault trees to analyze data and determine ALL causal factors
  - Use PII’s Root Cause Chart <sup>™</sup> to determine the multiple root causes of each causal factor
  - Draft effective recommendations and make presentation to class
- *Course examination (optional)*

### Pricing for Public Offerings (per student):

\$1045.00 USD, in USA

\$1995.00 USD, in Oman, Dubai [UAE] or Bahrain

## Course 4-O: Incident Investigator/Root Cause Analysis Overview (1-Day)

**Recommended prerequisites: None**

This training provides a general background in how investigations and root cause analysis (RCA) are performed. It explains the importance of near miss reporting and investigation as a proactive tool to control risk before losses/harm occur. This course is for anyone who needs a general understanding of investigations, including reporting of near misses and how to interview.

### ***Typical Course Candidates***

- Operations and Maintenance Staff, process reliability, and process quality control/assurance staff who may be team members
- Managers who must ensure active participation on investigation and RCA processes

### ***You Will Learn:***

- How to meet regulatory requirements for incident investigations
- How and why to report near misses
- How to help a team gather data, especially interviewing of peers
- Overview of cause determination methods and overview of effective root cause determination methods
- How to develop appropriate recommendations to address root causes

### ***Take Home:***

- Comprehensive course notebook containing Root Cause Chart™
- Certificate of Completion and 0.7 CEUs & 0.7 COCs

## **Course Outline**

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### **Day 1 (8:00 a.m. to 4:00 p.m.)**

- Basics of incidents and investigations
- **Workshop: Identifying near misses (near hits)**
- Gathering data
  - Gathering data from people
- **Workshop: Identifying key data needs**
- Analyzing data for ALL causal factors
- Determining ALL root causes of each causal factor
- **Workshop: Identifying root causes using the “Root Cause Chart” technique**
- Developing conclusions and recommendations

## **More Information**

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### **Schedule:**

This course is only offered as a private offering at a client’s site. Please contact PII for details about having our training provided at your site.

## **Course 5: Writing Effective Operating and Maintenance Procedures (2-Day)**

**Recommended prerequisites: Participants should have practical, technical experience in design, operation, or maintenance of complex systems.**

This course teaches how to write effective step-by-step operating procedures and how to develop troubleshooting guides from PHA documentation. This is very much a "How To" course, designed to teach skills. The first day of the course is for both operations and maintenance personnel; the second day is mainly for operators (since they typically must write more in-depth troubleshooting guides).

### ***Typical Course Candidates***

- Senior Operations and Maintenance Technicians are the primary targets of this course, since they should write their procedures and take ownership of them (maintenance technicians need only to attend the first day)
- Engineers – Process, Safety, and Mechanical
- PSM and Quality Compliance Auditors

### ***What You Will Learn***

- How to comply with regulatory requirements and quality control requirements for procedures
- How to perform detailed task analysis and writing step-by-step instructions
- How to assess current procedures for addressing best practice rules
  - This will be done in class, so bring procedures for review
- How to address operating limits and process deviations
- How to develop troubleshooting guides
- How to avoid common procedural errors that can reduce safety and quality levels, leading to incidents
- How to choose the best page layout/format for the goal of each procedure
- Learn 22 rules to help you write every step-by-step procedures effectively
- Learn where/when written procedures are required

### ***Take Home:***

- Comprehensive course notebook containing
  - Examples of acceptable procedural formats
  - Checklists for identifying missing procedures, gathering procedure information, formatting procedures, and writing step-by-step instructions
  - Completed workshops from class exercises, including typical solutions for each
- Electronic (PDF) copy of course notebook
- Certificate of Completion
- 1.3 CEUs & 1.3 COCs



## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

- What is an effective procedure?
  - Goals, general concepts, definitions
  - Overview of process for developing procedures
  - Procedure requirements: industry standards for quality & safety regulations
  - Introductory Workshop: Writing effective instructions for a simple task (shows ahead of time why effective procedure writing rules are critical)
- Formatting the procedures
  - Step-by-step formats; Use of white space; Step numbering
  - Document control features — headers and footers
  - Introductory items — procedure titles, sections, and section titles
  - Use of graphics/figures
  - Review of Formatting rules and why each is important
- Writing step-by-step instructions
  - Rules for writing the most effective instructions: Using commands; keeping it simple; being consistent; being precise; use of references
  - **Workshop: Improving a poor step-by-step procedure**
- Addressing Operating limits and deviations
  - Defining “operating limits,” “deviations,” and more
  - Identifying deviations that may occur, including errors of omission and errors of commission (for step-by-step procedures)
  - Defining procedural boundaries using conditional statements, warnings, and cautions (for step-by-step procedures)

### Day 2 (8:00 a.m. to 3:30 p.m.)

- Addressing Operating limits and deviations (for continuous mode of operation)
  - Listing the triggers for process parameters where action is required
  - Identifying the worst case and more likely consequences
  - Developing troubleshooting steps (diagnosis steps, steps to prevent excursions, steps to correct excursions)
  - **Workshop: Developing a troubleshooting guide for continuous operating mode**
- Deciding what procedures are needed
- Gathering information for a procedure
  - When/why the procedure will be performed
  - Main steps, substeps, details, hazards, precautions
  - **Workshop: Creating a procedure from basic information**
- Verifying, validating, and certifying procedures
- Overview of managing changes to procedures
- Overview of risk review of procedures
- *Optional Exam*

### Pricing for Public Offerings (per student):

\$795.00 USD

## **Course 6: Mechanical Integrity (2-Day)**

**Recommended prerequisites: Participants should have practical, technical experience in maintenance of complex systems.**

This course prepares you to evaluate your existing practices versus recognized codes and standards and then to efficiently improve or develop and implement your mechanical integrity (MI) program. Topics also include how to merge your MI program with a reliability program. To enhance the value of your training investment, plan to attend Course 6's companion course on writing effective maintenance procedures (Course 5).

### ***Typical Course Candidates***

- Designated employee responsible for designing, developing, and implementing a PSM based MI program
- Engineers – Mechanical & Plant
- Managers – Plant Manager, Maintenance, and Production
- PSM Manager or Coordinators

### ***What You Will Learn***

- Up-to-date MI strategies and techniques for effectively building and implementing a comprehensive MI program that addresses process safety management requirements and/or reliability and other concerns as defined through company, industry, and regulatory requirements
- Through lectures and case-study-based workshops, you will learn how to develop, implement, and maintain an efficient MI program. The experienced instructor guides you through building your own MI program regardless of the age, size, or complexity of the facility
- How to expand this program to encompass reliability and quality goals
- How to define and assign roles and responsibilities
- How to integrate your new or revised MI program with existing MI activities
- Develop an inspection and testing plan using your own equipment list or generic examples
- Quality assurance methods for identifying & resolving equipment deficiencies
- How to develop maintenance procedures and training programs for maintenance personnel
- How to develop a maintenance procedures list for your plant site

### ***Take Home:***

- An easily adaptable written MI program
- A comprehensive notebook covering all course topics
- Electronic (PDF) copy of course notebook
- A Certificate of Completion
- 1.3 CEUs or 1.3 COCs

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

- Introduction
  - Learning objectives, goals, and motivations for mechanical integrity (MI)
    - » Regulations, standards, and interpretations
    - » Relationship to Reliability programs
- Designing a mechanical integrity program
  - Minimal MI only for compliance or a fully integrated reliability program?
  - Something in-between?
  - **Workshop: Deciding in detail what you need your MI program to address (this sets the basis for later workshops and discussion)**
- Developing a mechanical integrity program
  - **Equipment identification and related issues**
    - » List of critical equipment
    - » Types of MI activities (reactive, proactive, preventive, predictive)
    - » Choosing the right task type and choosing the specific task
    - » Determining the right frequency for the task (condition or time dependent)
    - » **Workshop: Starting the development of an inspection, test, and preventive maintenance (ITPM) plan**
  - **Personnel focus**
    - » Procedures & Training
    - » **Workshop: Completing the development of an ITPM plan by identifying written procedures and training needs for your mechanical integrity program**

### Day 2 (8:00 a.m. to 3:30 p.m.)

- Developing a mechanical integrity program (continued)
  - **Management systems required and related issues**
    - » Quality assurance; Equipment deficiency resolution; root cause analysis; management of change
    - » **Workshop: Identifying gaps in your quality assurance plan and identifying additional needs for procedures and training**
- Implementing/Maintaining a mechanical integrity program
  - Review of detailed checklist for implementing an MI/reliability system
  - Documenting and managing data/results, computer systems and other equipment files
  - **Workshop: Customizing the detailed implementation checklist to your specific needs (optional)**
- Roles and Responsibilities for MI
- **Workshop: Identifying roles and responsibilities for your MI program**
- Key performance indicators for MI and continual improvement of a mechanical integrity program
- *Optional Exam*

### Pricing for Public Offerings (per student):

\$795.00 USD

## **Course 7: Management of Change & Pre-Startup Safety Review (2-Day)**

**Recommended prerequisites:** Participants should have practical, technical experience in design, operation, or maintenance of complex systems.

MOC is the element for which all other “foundation” elements of PSM are implemented. It is the PSM element that controls introduction of new risk. Recognizing change, analyzing the risk of each change, and handling small changes efficiently are just some of the barriers that managers face with MOC implementation. This 2-day course explores proven strategies for implementing a workable MOC system and customized approaches to fit your company’s culture. It also shows how to implement physical and instrumentation changes through the proper use of pre-startup safety review (PSSR) systems, sometimes called operational readiness reviews (ORRs). Written examples of programs for addressing simple and complex changes are included in the course notebook.

### ***Typical Course Candidates***

- PSM coordinators and HSE professionals
- Engineers, Technical Managers, and Supervisors
- Quality control managers and staff
- Most other operation, maintenance, reliability, and quality staff who are involved with designing, implementing, and evaluating MOC programs

### ***What You Will Learn***

- Requirements of a complete MOC System
- What PSSR is and how it works and how it can be combined with MOC and mechanical integrity systems
- How to realistically control both small and large changes, minimizing employees’ needs to bypass the system
- Simple frameworks for identifying and analyzing risks associated with a recommended change to help ensure the minimum losses to your company (this is the heart of any MOC system)
- Training needs and requirements for all levels of your organization necessary to make managing change a functional system.
- How to integrate all company systems for managing specific functional changes into one MOC system to handle PSM, HSE, quality control, reliability, and productivity changes; and learn why this integration is so important

### ***Take Home:***

- Training tools for teaching your employees to recognize the difference between a replacement-in-kind and a change (take home copies included)
- Copies of real MOC and PSSR written programs, forms, and checklists of risk review & PSSR questions
- Electronic (PDF) copy of course notebook
- A Certificate of Completion
- 1.3 CEUs or 1.3 COCs

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

- Introduction
  - Learning objectives and overview of PSM
  - Overview of PSM
  - Overview of MOC and PSSR
  - **Workshop: Identifying which MOC failures led to a catastrophe**
- Recognizing or proposing changes
  - Review of basic definitions of replacement-in-kind (RIK) and not-replacement-in-kind (NRIK)
  - **Workshop: RIK vs NRIK Quiz**
  - **Workshop: Developing RIK and NRIK examples for your company**
- Initiating the change request
  - Who does what?
  - Initiating the change request form
  - Example of change request forms
- Reviewing the proposed change
  - Technical reviews and Risk reviews
  - **Workshop: Choosing the appropriate risk review method for a minor mechanical change**
  - **Workshop: Performing a risk review of a minor mechanical change**

### Day 2 (8:00 a.m. to 3:30 p.m.)

- Reviewing the proposed change (continued)
  - **Workshop: Performing a risk review of a minor procedure change**
- Approving and implementing the change
  - Roles, responsibilities, and authorities
  - Tracking the change request through closure
- Pre-Startup Safety Reviews
  - Definitions and Style of PSSRs
  - Combining PSSR with other PSM or Reliability systems
  - **Workshop: PSSR Quiz**
  - **Workshop: Performing a PSSR for a minor mechanical change**
- Overall Roles and Responsibilities
- Managing the MOC/PSSR program(s)
  - MOC/PSSR scope decisions
  - Review of typical MOC Program in notebook
  - Review of typical PSSR Program in notebook
- Key Performance Indicators
- **Workshop: Implementation planning**
- *Optional Exam*

### Pricing for Public Offerings (per student):

\$795.00 USD

## Course 8: PHA Leadership Training (4- or 5-Day)

**Recommended prerequisites: Course 1 or Course 2 is recommended unless student has equivalent experience. Course graduates will be capable of organizing, leading, and documenting PHAs of processes or for changes to processes (MOC risk review). Only those who will be leading and/or scribing PHAs or administering the PHA (risk review) program should attend. Courses 9, 10, and 11 are highly recommended after this course.**

The risk review techniques most popular for initial PHAs of entire units or of large projects, MOC reviews, and PHA revalidations are hazard and operability (HAZOP) analysis and what-if/checklist. Both of these techniques facilitate systematic, imaginative searches for process hazards and potential operational difficulties. In this course, you will also learn how to use the failure mode and effects analysis (FMEA) method and you will learn how to use checklists of hazards to supplement your brainstorming analyses. You will learn the best situations and circumstances to use each technique. **This course is mostly workshops: You will lead and participate in several analyses to familiarize yourself with each technique.**

### ***Typical Course Candidates***

- Process engineer or project engineer
- Operations supervisor
- PSM coordinator
- E, H, & S Managers & Engineers

### ***What You Will Learn***

- How to perform a PHA to meet PSM requirements for initial PHAs and management of change analyses including these critical elements:
  - How to prepare for the PHA; Scope the PHA; Collect information; Select the team; Lead a meeting; Document results
- **How to analyze operating procedures for critical accident scenarios**
- How and when to apply HAZOP, FMEA, and/or what-if/checklist analyses methods to any process system in any industry

### ***Take Home:***

- A CD containing hazard evaluation software and manual (license not included; demo works for 15 days; a license can be obtained separately)
- Blank PHA analysis forms, generic PHA report, and a spreadsheet for estimating the labor and time requirements for doing a PHA
- Electronic (PDF) copy of course notebook
- A copy of the course notes and problem solutions
- A Certificate of Completion
- 2.7/3.1 CEUs and 2.7/3.1 COCs

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

- Introduction: Learning objectives; Overview of process safety management; Risk assessment concepts; Overview of PHA requirements
- Overview of risk review methods
  - Methods and their usefulness over the life cycle of a process; Making risk judgments; Human factors concepts and how to address human factors during hazard evaluations
- Preparing for the hazard evaluation (risk review or PHA)
  - Scoping the analysis; Choosing technique and level of detail and sections; Choosing the team members
  - Logistics and procedures for pre-meeting, meeting, and post-meeting tasks
- What-if/checklist technique
  - **Workshop: What-if/checklist review of a continuous process**

### Day 2 (8:00 a.m. to 5:00 p.m.)

- HAZOP technique
  - **Workshop: HAZOP review of a continuous process**
- Analysis documentation, results, and follow-up
  - **Workshop: HAZOP review of a continuous process (continued)**

### Day 3 (8:00 a.m. to 5:00 p.m.)

- **Workshop: HAZOP review of a continuous process (continued)**
- HAZOP/what-if techniques for analyzing procedures and batch processes
  - **Workshop: HAZOP/what-if reviews of batch processes & procedures**

### Day 4 (8:00 a.m. to 5:00 p.m.)

- **Workshop: HAZOP/what-if reviews of batch processes & procedures**
- Failure Mode Effect Analysis (FMEA)
  - **Workshop: FMEA of a critical auxiliary system**
- Checklist analysis as supplements to brainstorming methods
  - **Workshop: Using Checklists after brainstorming methods**
- **Workshop: Estimating the schedule & labor required to perform a PHA**
- *Certification exam (optional)*

### Day 5 (8:00 a.m. to 2:00 p.m.)

(optional Software Training – Does NOT include a license to the software)

- **Workshop: How to use software to prepare for and document hazard evaluations/risk reviews**

### Pricing for Public Offerings (per student):

\$1,695.00 USD for 4-day version, in USA

\$1,995.00 USD for 5-day version, in USA

\$2,995.00 USD for 5-day version, in Oman, Dubai [UAE], or Bahrain

## Course 8-O: PHA Overview Training (1 Day)

### Recommended prerequisites: None

This training provides general background in how process hazard analyses (PHAs) are performed. It explains the importance of PHAs for existing plants and PHAs/hazard reviews for changes to processes. This course is for anyone who needs a general understanding of PHAs.

### Typical Course Candidates

- Operations and Maintenance Staff, process reliability, and process quality control/assurance staff who may be team members
- Managers who must ensure active participation in PHA and hazard reviews

### You Will Learn:

- How to meet regulatory requirements for PHAs
- Overview of team meetings and team member responsibilities
- Overview of hazard review methods
- Overview of making risk judgments in team settings
- Overview of how to develop effective recommendations and how to effectively resolve recommendations

### Take Home:

- Comprehensive course notebook
- Certificate of Completion and 0.7 CEUs & 0.7 COCs

### Course Outline

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#### Day 1 (8:00 a.m. to 4:00 p.m.)

- Basics of PHAs and other related hazard reviews required over the life of a process
- Overview of team meetings and team member responsibilities
- Video: Typical team meeting
- Overview of risk review methods
- Workshop: What-if analysis of a simple system
- Overview of making risk judgments in team settings
- Overview of how to develop effective recommendations and how to effectively resolve recommendations

### More Information

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#### Schedule:

This course is only offered as a private offering at a client's site. Please contact PII for details about having our training provided at your site.



## **Course 9: Updating and Revalidating Process Hazard Analyses (2-Day)**

**Recommended prerequisites:** Previous training in leading PHAs, such as completion of Course 8, as well as experience in leading PHAs of entire units.

This course prepares you to execute a PHA revalidation that complies with PSM regulations and industry standards. PHAs usually must be updated and revalidated every 5 years. Several factors determine the extent of the revalidation analysis, including the quality of your previous PHAs and its documentation, process and facility changes, incidents during the past 5 years, and new interpretations of codes and standards. In some cases a complete “redo” may be required if the previous PHA quality and documentation did not meet your standards or regulatory requirements.

### ***Typical Course Candidates***

- Anyone who wants to understand how to decide on an appropriate approach for PHA revalidations and/or lead PHA revalidations should consider attending. Though this course is primarily for PHA leaders, anyone with the following background will also find the course valuable:
  - Process engineer
  - PHA element coordinator/manager/owner
  - PSM coordinator and auditors
  - E, H, & S Managers & Engineers

### ***What You Will Learn***

- Options and requirements for leading a team through a revalidation process that satisfies PSM requirements and utilizes the best approach for your company
- Resource requirements for performing a revalidation
- Preparation, execution, and documentation steps to meet company’s goals, streamline future analyses and to produce a functional report useful to many
- Experience in leading and documenting PHA revalidations through workshops
- Factors to determine the appropriate revalidation approach
- How to address previous PHA deficiencies
- How to identify improvements in operating procedures, training, and preventive maintenance through the revalidation process

### ***Take Home:***

- A revalidation decision tree (flowchart) to assist you in choosing the right revalidation approach for your facility
- A copy of the course notebook
- A Certificate of Completion
- 1.3 CEUs and 1.3 COCs

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

- Learning objectives and goals of revalidation
- Overview of PSM requirements for PHAs and Revalidations
  - Terms and definitions
  - Determining your goals (minimal compliance versus meeting the needs of procedure writers, trainers, and equipment reliability departments)
- Gathering required information
  - Previous PHA report and recommendation closure documents
  - Incident reports since previous PHA cycle
  - MOC records
  - Current P&IDs and P&IDs as existed during previous PHA cycle
  - Current SOPs and SOPs as existed during previous PHA cycle
  - **Workshop: Review of previous versus current documents to determine if MOC has worked adequately**
- Assessing the previous PHA report and other data
  - **Workshop: Compliance/Quality review of an example PHA**
- Considering “lessons learned”
- Defining the revalidation approach
- **Workshop: Choosing the revalidation approach (for an example PHA and set of gathered data)**

### Day 2 (8:00 a.m. to 3:30 p.m.)

- Conducting the revalidation
- **Workshop: Revalidating a PHA (multiple examples)**
- Documenting the revalidation
- **Workshop: Revalidating a PHA (multiple examples)**
- *Certification examination (optional)*

### Pricing for Public Offerings (per student):

\$795.00 USD

## Course 10: Preventing Human Errors (2-day version; can also be condensed to 1-day)

**Recommended prerequisites: None. However, this course is an excellent supplement to several other courses, particularly Course 4: Incident Investigation/RCA Leadership and Course 8: PHA Leadership and Course 7: MOC & PSSR. All the issues covered in these three courses depend heavily on understanding how and why humans make mistakes.**

Human error is widely acknowledged as the major cause of quality, production, and safety risks in many industries. This course explains the underlying reasons why humans make mistakes and how you can prevent these mistakes. Although it is unlikely that human error will ever be completely prevented, there is growing recognition that many human performance problems stem from a failure within organizations to develop an effective policy for managing human reliability.

The course will provide hands-on experience of practical error reduction techniques, using real-life case studies. You will also gain an understanding of the underlying causes of human error and how to reduce its occurrence by changing the culture of the organization and changing the design of the processes. **Workshops are used throughout the course to illustrate concepts and to demonstrate human error analysis applications.**

### ***What You Will Learn:***

- Why human error is a factor in all accidents
- Why humans make mistakes and proven error prevention techniques
- How to analyze and identify human errors and the conditions and situations that cause them
- How weak policies and procedures in areas of human resources, training, management, communication, and workplace design cause human errors
- How to improve and optimize procedures, workplace design, process design, and more to improve human performance

### ***Take Home:***

- Comprehensive course notebook containing
  - Checklists and worksheets for several human error analysis techniques
  - Industry examples
- Certificate of Completion
- 1.3 CEUs & 1.3 COCs (2-day version) or 0.7 CEUs & 0.7 COCs (1-day version)

### ***Typical Course Candidates***

- Managers – Operations, Safety, and Executive; and Production Supervisors
- Training Managers
- Engineers – Process, Safety, and Mechanical
- PSM Coordinators and Managers
- PHA (hazard review) Leaders and Incident Investigators

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

#### Introduction to Human Error

- Learning objectives and goals of human error prevention
- What is human error and human error analysis?

#### Understanding Human Error:

- Errors and their relationship to loss events
- Which is most important: Management system deficiencies or personal behavior?
- Types of human error
- **Workshop: Classifying Human Errors**
- Modeling human behavior (an example of a simple model that works is used throughout the course)
- Elements associated with understanding and controlling human error
- **Workshop: Relating Human Error to Human Factor Influences**

#### Common Human Error Prevention Techniques

- Information Presentation Rules (procedures, trainers, communication, signs, etc.)
- Process/Operation/Workplace Design Rules
- Other General Rules
- Exercises

### Day 2 (8:00 a.m. to 3:30 p.m.)

#### Techniques for Predicting and Analyzing Human Error

- Checklist Analysis: For situational and for management system related errors
- **Workplace walk-through analysis**
- Guideword-based analysis (HAZOP, Job Hazard Analysis, etc.)
- Quantitative Human Reliability Analysis
- **Workshop: Deciding Which Human Error Analysis Techniques to Use**
- **Workshop: Using Simple Technique for Predicting and Analyzing Human Errors**

#### Industry and Governmental Resources for Controlling Human Errors

- Related codes, standards, and regulations
- Industry guidelines

#### Behavior/Habits

- What controls human behavior (T-H-O theory and analysis)
- Implementation strategies for controlling undesired behaviors
- **Workshops:** STAR (Specific Task Action Reporting)

#### Workshop: Planning Your Path Forward

#### Pricing for Public Offerings (per student):

\$795.00 USD (for 2-day version, USA)

\$1,495.00 USD (for 2-day version, in Oman, Dubai [UAE], or Bahrain)

## Course 11: Layer of Protection Analysis (LOPA)

**Recommended prerequisites: Attendees should have strong technical skills and prior training in qualitative hazard evaluation techniques; prior completion of Course 8: Process Hazards Analysis Leadership or equivalent is highly recommended.**

Are proposed or existing combinations of safeguards enough to prevent an accident or mitigate the consequences? Do you perceive that doing a fully quantitative risk assessment (QRA) would be over-working the problem? Then Layer of Protection Analysis (LOPA) is the new tool you need to learn. LOPA combines both qualitative and quantitative elements of hazard evaluation and risk assessment to analyze and judge the adequacy of existing or proposed safeguards against process deviations and accident scenarios. A key to the success of LOPA is its rules for judging if protection layers are truly independent. Because of these rules, LOPA helps the analysts make consistent judgments of if the risk of scenarios are "as low as reasonably practical (ALARP)". This "How To" course is taught by one of the principal authors of the AIChE/CCPS book, *Layer of Protection Analysis (2001)*. **Workshops are used as the primary mode of teaching each aspect of LOPA. You will perform several complete LOPA before leaving class.**

### **What You Will Learn:**

- When and how to use LOPA and How to systematically create risk scenarios
- How to establish risk acceptance (risk tolerance) criteria for use within your company (this is also called development of ALARP criteria)
- How to calculate "as-is" risk for a cause-consequence pair:
  - Estimate the frequency of the initiating event and estimate consequence
- What is meant by "independence" and "uniqueness" with respect to IPLs
- How to use LOPA to determine the Safety Integrity Level (SIL) necessary for an instrument IPL (to comply with the requirements of IEC 61508/61511)
- How other companies worldwide use LOPA to:
  - Decide which PHA/HAZOP recommendations to reject and which to accept
  - Focus limited resources within mechanical integrity departments and operations on what is critical to manage risk to ALARP
  - Avoid wasting resources on quantifying risk using QRA methods
  - Perform specialized risk modeling for facility siting questions

### **Take Home:**

- Comprehensive course notebook containing: Examples of risk acceptance and judgment protocols & Industry examples and solutions to all LOPA workshops
- Certificate of Completion and 1.4 CEUs & 1.4 COCs

### **Typical Course Candidates**

This course is designed for **experienced PHA/HAZOP leaders**. Other individuals with a strong technical background (such as engineers and scientists) may attend:

- Managers of Operations, Safety; Project Managers; Engineers – Process, Safety, and Mechanical; PSM Coordinators and Managers

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

#### Introduction to LOPA

- Learning objectives and goals of using the LOPA technique
- What is LOPA? How is LOPA applied? Definitions? When is LOPA used?

#### Developing LOPA Scenarios

- Selecting candidate scenarios from brainstorming hazard evaluations
- Scenarios from design questions and from incidents

#### Estimating the Consequence of the Scenario

- Using a look-up table of consequence; Developing a consequence look-up table for your company; Alternative methods for estimating consequences
- **Workshop 1: Estimating the consequence of a scenario (part of a continuing example)**

#### Estimating the Likelihood of the Selected Initiating Event

- Using a look-up table of initiating event categories and frequencies
- How to develop an initiating event look-up table for your company
- Addressing enabling conditions and time-dependent initiating events
- **Workshop 1: Estimating the frequency of an initiating event of a scenario (part of a continuing example)**

#### Estimating the Probability of Failure of Independent Protection Layers

- Definitions, rules, and exceptions for giving credit for an independent protection layer (IPL); Using a look-up table of IPL categories and probability of failure on demand (PFOD); How to develop an IPL look-up table
- **Workshop 1: Deciding which safeguards are valid IPLs and estimating the PFOD of the valid IPLs (part of a continuing example)**

#### Calculating the Risk

- Using a standardized LOPA worksheet; Rules for calculating risk for an individual scenario (LOPA); Rules for summing risk of related scenarios
- **Workshop 1: Calculating the risk of a LOPA scenario (part of a continuing example)**

### Day 2 (8:00 a.m. to 3:30 p.m.)

#### Judging the Risk

- Examples of risk tolerance criteria from the industry
- Development and implementation of a company risk tolerance criteria
- **Workshop 1: Judging the risk of a LOPA scenario (cont. example)**

#### Case Studies

- **Workshop 2: Performing LOPA from beginning to end for a scenario**
- **Workshop 3: Performing several LOPA, beginning with a set of HAZOP tables and deciding which scenarios need LOPA**

#### Special Applications of LOPA

- Using LOPA for facility siting questions; Selecting the SIL for an interlock
- **Workshop 4: Estimating the composite risk for facility siting**

#### Planning your path forward with LOPA

#### Pricing for Public Offerings (per student):

\$795.00 USD (for 2-day version)

\$1495.00 USD (for 2-day version) in Dubai, Bahrain, and Oman

## Course 12: Safety Integrity Systems (SIS & SIF & SIL)

**Recommended prerequisites:** Attendees should have strong technical skills and prior training in PHA/HAZOP and LOPA for determining SIL requirements; prior completion of Course 11: Layer of Protection Analysis (LOPA) or equivalent is highly recommended. Students should also have good understand of process engineering and instrumented controls.

Are you involved in determining SIL levels or designing SIS? Do you think that too many SIS (or too high of SIL ratings) are being recommended for your site? Do you just want to understand what SIS are and where they fit in to control risk and how these are specified, designed, installed, and maintained? Do you want to know how human error dominates the ACTUAL performance in the field of installed SIS? Then this is the course for you.

This course explains SIS from the ground up and explains how these have replaced the definitions of emergency shutdowns (ESDs) and how they different from basic process control systems, such as a DCS. This course differs from others in that you **will also learn the state of the art in SIL Verification (and Design) calculations, including how to account for systemic errors caused by human error**; these can dominate the failure rate for SIL 2 and SIL 3 systems.

This "How To" course is taught by one of the principal authors of the AIChE/CCPS two books, *Layer of Protection Analysis (2001)* and *Initiating Events and Independent Protection Layers (IPLs) (2011)*. The instructor is also working with the ISA TR 84.00.04 committee for developing and recommending methods for SIL Verification. The course covers all aspects of how to apply this very useful technique. **Workshops are used as the primary mode of teaching for SIF design and SIL Verification. You will perform several complete SIL Verifications before leaving class.**

### **What You Will Learn:**

- History of SIS
- What is a safety instrumented function (SIF) and safety integrity level (SIL)
- How to determine if a SIF is needed or not, and especially learn if the the other independent protection layers are sufficient for controlling risk to as low as reasonably practical (ALARP).  
**NOTE: other courses will teach you methods that OVER SPECIFY the need for SIS; this course teaches you the unbiased way to determine the proper number of SIF and proper SIL for each.**
- Minimal requirements from international SIS standards such as ANSI/ISA 84 and IEC 61511 (and the basics of 61508). But, also learn the industry best practices behind and beyond these standards.
- How to specify and design SIS to meet the required functions and SIL.
- How to verify the SIL for a design
- Requirements for installation and validation of the SIS
- Requirements for ongoing inspection, testing, and maintenance of SIS, including ongoing proving of the SIL.

### **Take Home:**

- Comprehensive course notebook containing industry examples and solutions to all SIL Verification and Design workshops
- Certificate of Completion
- 1.4 CEUs & 1.4 COCs

## Typical Course Candidates

This course is designed for those needing to learn what SIS are, and especially those wanting to learn how to verify SIL design and install and validate SIS/SIL. The course workshops focus mostly on SIL verification and design. The coverage of SIL determination is minimal since Course 8 and Course 11 cover this topic in detail. Consider taking this course in conjunction with Course 11, LOPA. Those who may benefit from this course include:

- Managers – Operations, Safety
- Project, Engineering, and Technical Managers
- Engineers – Instrumentation, Electrical, Process, Safety, and Mechanical
- Technicians/Specialist - instrumentation
- PSM Coordinators and Managers

## Course Outline

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### Day 1 (8:00 a.m. to 5:00 p.m.)

#### Introduction to SIS

- Learning objectives and goals of using SIS
- History of SIS and basic definitions
- Where does SIS fit with other ways to control process risk?
- Relationship of SIS to ESD and basic process control systems (BPCS), such as field PLCs, relays, and DCS
- What are safety integrity levels (SILs) and what are the basic requirements for SIL 1, 2, & 3
- Lifecycle of SIS
- Overview of related international standards, ANSI/ISA 84 and IEC 61511 (and 61508)
- Overview of human factors and the impact of human error on SIS. **Note: No other SIS course covers this all-important topic.**

#### Determining if a Safety Instrumented Function (SIF) is Needed and if so, what SIL is needed.

- Evaluating all IPLs using qualitative (brainstorming) hazard evaluations methods (such as HAZOP), semi-quantitative methods (such as LOPA and Risk Graphs), and quantitative methods (such as fault tree analysis)
- Determining the risk reduction to allocate to the SIF (if any), which in turn specifies the SIL
- **Workshop 1: Determining the need for SIF and the related SIL from a HAZOP report**

#### Specifying the SIF and Designing the Related SIS.

- Determining the process requirements, such as how the process will be brought to safe state, in what order of steps, and with what delays, and also how the process will be restarted after a trip.
- Using the process requirements to develop the Safety Requirements Specification (SRS)

#### Designing the SIS to meet the required SIL

- Basic reliability terms (such as failure rates, MTTF, MTTR, and MART) and limitations of reliability data
- Basic reliability equations and converting between failure rates and probability of failures on demand (PFD)
- Options for improving SIL rating of a base design, including use of redundancy, changing test intervals, changing reliability of base components, and reducing chances for systemic errors (especially human errors)
- **Workshop 2: Basic SIL calculations**



## Day 2 (8:00 a.m. to 3:30 p.m.)

### Designing the SIS to meet the required SIL (continued)

- **Workshop 3: Using redundancy to improve SIL rating**
- **Workshop 4: Using shorter test intervals to improve SIL rating**

### Estimating the PFD of a SIF to Verify the SIL.

- Definitions, rules, and exceptions for determination of SIL
- Using a look-up tables of reliability data and PFDs
- Calculations using simple equations
- **Workshop 5: Extending calculations on Workshops 3 and 4 to include systemic failure probability**
- Calculations using other methods, such as Fault Tree and Markov analyses

### SIS fabrication, installation, and startup

- Issues for fabrication and vendor qualifications
- Installation issues, especially related to maintainability and survivability and and limit common cause failures
- Startup and initial validation test, leading to site acceptance test (SAT)

### SIS maintenance and proof testing (validation) for the life of the SIS

- Maintenance planning and procedures
- Proof testing and record-keeping requirements for ongoing SIL Validation

### Case Studies

- Industry example of SIS and issues with each
- Specialized SIS designs: HIPPS, Burner Management Systems (BMS)
- **Workshop 6: Pulling it all together from beginning to end**

### Planning your path forward with SIS

### Pricing for Public Offerings (per student):

\$795.00 USD (for 2-day version)

\$1495.00 USD (for 2-day version) in Dubai, Bahrain, or Oman

## Course 13: Job Safety Analysis (JSA) – 4-6 hrs per session

### Recommended prerequisites: None

In this course, you will learn the basics of the performing a Job Safety Analysis (JSA), which is a proven process for controlling operating hazards and costs. You will get a step-by-step overview of the process, and define your role in making it effective.

Through lecture, demonstrations, and workshops, you'll learn how to develop and manage a JSA program in your workplace. You'll also learn how to enlist participation from line employees, supervisors, and upper management. The result: Better processes make a safer workplace - and that means improved production and higher profits.

### **Who should attend:**

- This course is for anyone involved in operations and maintenance that needs to know how to perform JSAs of new or existing tasks.
- In addition, full-time safety practitioners, safety committee members, safety coordinators, safety specialists, human resources, safety managers, loss control managers, and operations managers can benefit from this course

There a maximum of 15 students per 4 to 6 hour session.

### **Take Home:**

- Comprehensive course notebook containing: Checklists of JSA and JHA issues information, Example forms; blank and filled-in
- Certificate of Completion; 0.4 to 0.7 CEUs & 0.4 to 0.7 COCs

### Course Outline

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#### **Day 1 (4 to 6 hour per session)**

- Overview of JSA:
  - Understanding JSAs and when to do them
  - JSA terminology
- Understanding JSA's relation to continuous improvement in your organization
- Identify the key requirements for a successful JSA
- Recognize the hazards inherent in task performance
- Develop appropriate solutions and hazard controls
- Example management system
- **Workshop: Complete a JSA for example at your site (or using standard examples in course) to reduce personal injuries and operating costs (repeated 2 or 3 times, as time permits)**

### More Information

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#### **Schedule:**

This course is only offered as a private offering at a client's site. Please contact PII for details about having our training provided at your site.

## Course 14: Human Error Prevention – For Workers (1 to 3 days, depending on needs)

### Prerequisites: None

In this course, the workers (hourly workers such as operators, technicians, lab personnel, etc.) learn the basics of what causes humans (them) to be more likely to make mistakes and what they can do to prevent errors. It also briefly reviews the role that management actions play in preventing human error. The student leaves with checklists and practice in identifying error-likely situations in the workplace. This course is best in 3-day format with JSA and STAR as modules comprising 1.5 of the 3 days. For the basics on human error prevention only, 1 to 1.5 days is sufficient.

### Who should attend?

- This course is for anyone involved in operations, maintenance, lab, utilities, and other support areas to a process, with direct hands-on responsibilities.
- In addition, full-time safety practitioners, safety committee members, safety coordinators, safety specialists, human resources, safety managers, loss control managers, and operations managers can benefit from this course

There a maximum of 15 students per 1 to 3 day sessions.

### Take Home:

- Comprehensive course notebook containing: Checklists of Human Error causes
- Certificate of Completion; 0.7 to 2.1 CEUs & 0.7 to 2.1 COCs

### Course Outline

---

#### 1 to 1.5 Days (unless coupled with JSA and STAR, as recommended)

- Overview of Human Error and Human Error Causes
- Categories of Human Error Causes
  - Review of each cause in each category
  - Examples from actual industry settings of good and bad designs/systems
  - Examples of how to identify and reduce the causes
- Human Error Cause Prediction and Identification Methods
- **Workshops: Many hands-on workshops and exercises in determining and addressing the causes of human error (throughout the course)**

**NOTE: This course is BEST offered in a 3-day setting that combines Course 13: JSA and Course 15: STAR to give the workers several tools they can use immediately to prevent human error at their worksites.**

### More Information

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#### Schedule:

This course is only offered as a private offering at a client's site. Please contact PII for details about having our training provided at your site.

## **Course 15: Specific Task Action Reporting (STAR) - (1 day Worker course). Note: A ½-day to 1-day Manager's Course is also available on request)**

### **Recommended prerequisites: None**

In this course, workers learn why and how to perform observations and coaching of their peers in the workplace. The method, called "Specific [sometimes Safety is substituted for Specific] Task Action Reporting (STAR)," attacks bad habits directly, which are the most stubborn forms of human error causes to eliminate. STAR is based on the principle of reinforcing good behavior frequently and positively, while at the same time encouraging changes to poor habits in a coaching setting by peers (reducing the negative aspect of correction of bad habits). This method has a 70% success rate in reducing errors caused by bad habits.

### **Who should attend?**

- This course is for anyone involved in operations, maintenance, lab, utilities, and other support areas to a process, with direct hands-on responsibilities.
- In addition, full-time safety practitioners, safety committee members, safety coordinators, safety specialists, human resources, safety managers, loss control managers, and operations managers can benefit from this course

There a maximum of 15 students per 1 day session.

### **Take Home:**

- Comprehensive course notebook containing STAR forms and workshops
- Certificate of Completion; 0.7 CEUs & 0.7 COCs

## **Course Outline**

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### **1 Day (unless coupled with JSA and Human Error Prevention, as recommended)**

- Overview of Human Error and Human Error Causes
- How and Why we form Bad Habits and system for changing habits (THO analysis)
- STAR Method:
  - Developing inventory of undesired habits (behaviors)
  - Technique for observation
  - Closing the distance (coaching) to reinforce good habits & change poor habits
  - Documentation and score keeping
  - Example management system
- **Workshops: Many hands-on workshops and exercises in developing and performing and managing STAR (throughout the course)**

**NOTE: This course is BEST offered in a 3-day setting that combines Course 13: JSA and Course 14: Human Error Prevention to give the workers several tools they can use immediately to prevent human error at their worksites.**

## **More Information**

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### **Schedule:**

This course is only offered as a private offering at a client's site. Please contact PII for details about having our training provided at your site.

## **Course 16: Behavior-Based Safety - (2 day Overview Course).**

**Note: A 1- to 2-day Worker's Course is also available on request**

### **Recommended prerequisites: None**

This course will provide insight into current knowledge of human error and how it can be reduced. The course focuses on human errors related to undesired behaviors (habits), what causes these, and how to effectively remedy these. This topic has been taught in various forms since it's inception at Georgia Tech more than 30 years ago; you will receive the most up-to-date approaches in this course. You will learn in general what leads to negative behavior and how to prevent or correct these behaviors. You will learn specific approaches/tools you can put to use in your facilities for controlling behaviors/habits on a day-to-day basis. But to keep the topic of habits/behaviors in perspective, the course also includes a brief overview of all aspects of controlling human error, not just those related to behaviors or habits. NOTE: This course "contains" *Course 15: STAR*.

### **Who should attend?**

- This course is for anyone involved in operations, maintenance, lab, utilities, and other support areas to a process, with direct hands-on responsibilities.
- In addition, full-time safety practitioners, safety committee members, safety coordinators, safety specialists, human resources, safety managers, loss control managers, and operations managers can benefit from this course.

There a maximum of 15 students per course.

### **What You Will Learn:**

- Why human error is a factor in all accidents
- Why humans make mistakes and an overview of proven prevention techniques
- The basics of how others analyze and identify human errors and the conditions and situations that cause them
- How weak and deficient policies and procedures in areas of human resources, training, management, communication and workplace design can lead to human errors
- The basic so of how to improve and optimize procedures, workplace design, process design and more to improve human performance
- The most useful theories for understanding why humans develop habits
- The basics of how to improve habits and correct bad habits
- Tools/activities for improving habits/behaviors
- Management systems for improving and maintaining habits/behaviors

### **Take Home:**

- Comprehensive course notebook containing
    - Checklists and worksheets for several human error analysis techniques
    - Industry examples
    - STAR forms and workshops
  - Certificate of Completion; 1.4 CEUs & 1.4 COCs
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## Course Outline

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**Timing – 8:00 a.m. to 5:00 p.m.; for 2 days**

### **Introduction to Human Error**

- Learning objectives of course; Goals of human error prevention

### **Understanding Human Error:**

- Errors and their relationship to loss events
- Which is most important: Management system deficiencies or personal behavior?
- Types of human error
- Modeling human behavior (an example of a simple model that works is used throughout the course)
- Elements associated with understanding and controlling human error

**Behavior Science and Improving Human Behavior: (70% of the class-time will be allocated to this topic in the public course; the time can be allocated differently in a private course)**

- What controls human behavior (T-H-O theory and analysis)
- Identifying an inventory of key undesirable behaviors
- Applying T-H-O to undesired behaviors to identify how to correct bad habits
- Implementation strategies for controlling undesired behaviors
- **Case Studies**
- **Workshops:** STAR (Specific Task Action Reporting)

### **Common Human Error Prevention Techniques**

- Information Presentation Rules (procedures, trainers, communication, signs, etc.)
- Process/Operation/Workplace Design Rules
- Information Presentation Rules (procedures, trainers, communication, signs, etc.)
- Process/Operation/Workplace Design Rules
- Other General Rules
- **Selected Exercises**
- Overview of Techniques for Predicting and Analyzing Human Error

**NOTE: This course is BEST offered in a 3-day setting that combines Course 12: JSA and Course 13: Human Error Prevention to give the workers several tools they can use immediately to prevent human error at their worksites.**

### **Pricing for Public Offerings (per student):**

\$795.00 USD (for 2-day version, USA)

\$1,495.00 USD (for 2-day version, in Oman, Dubai [UAE], or Bahrain)

## **Course 17: Selecting the Right Manufacturing Improvement Tools (1- or 2-Day)**

**Recommended prerequisites: None.**

At the latest count there were some one hundred tools for improving manufacturing performance. At times the selection process can be overwhelming. At other times, a tool is selected, and gains are achieved, only to disappear within a year or two. How do we know what improvement tool is best suited for our organization? How do we know when to apply it? What are some of the fundamental issues we must address, regardless of the tools selected? This seminar is designed to enable you to relate your circumstances and issues to the tools and techniques, so that you can best decide which are relevant for you. It will help you select the right tools, at the right time, for the right problem, and then sustain the improvement achieved.

### ***Typical Course Candidates***

- Managers – Production, Maintenance and Executive
- Engineers – Reliability, Process, Safety
- Support Staff
- Anyone who leads or influences the direction and success of manufacturing plants

### ***What You Will Learn***

- Foundational Elements for Manufacturing Excellence
- How to select the right improvement areas
- Specific guidelines for developing written programs tailored for each PSM element
- How to avoid costly defects
- The tools learned will include: Lean Manufacturing, Six Sigma, Kaizen, TPM, Supply Chain Management, RCM, Predictive Maintenance, and Root Cause Analysis
- For each tool:
  - Individual tool strengths, weaknesses, where and when they work best, when they might not work, how to align the organization for their use, and so on
  - Additional training necessary for implementation of specific tools

### ***Take Home:***

- Comprehensive course notebook containing
  - Training material on all the tools included in the course
  - Take home appendices and workshops
- Certificate of Completion
- 0.7 CEUs & 0.7 COCs

### **Course Outline (1-day, 8:00 a.m. to 4:30 p.m.)**

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#### **Overview of Manufacturing Business Excellence:**

- Overview of manufacturing excellence; low cost producer profile
- The Reliability process for manufacturing excellence
- Leadership principles
- Change Management

**The Tools:**

- Business Level FMEA – Selecting the right improvement projects and tools
- Lean Manufacturing
- Kaizen
- Total Productive Maintenance (TPM)
- Six Sigma
- Supply Chain Management
- Reliability Centered Maintenance (RCM)
- Predictive Maintenance
- Root Cause Analysis

**Appendices:**

- OEE as a Means of Measuring and Managing Waste
- Business Level FMEA – Case Studies
- Performance Measurement Cascade
- Maintenance Planning and Scheduling
- Quick Changeover Process
- Shutdown/Turnaround Management

**Summary:****Potential Class Workshops:**

- Business Level FMEA
- Case Studies – Review and Decide What You Would Do
- Personal Reflection and Action Plan

**Take Home Workshops:**

- Business Level FMEA – Clean, Inspect, Restore – At Your Plant
- Developing Your Action Plan for Manufacturing Excellence
- Self Audit of Management Support and Plant Culture
- Self Audit of Operating Practices
- Self Audit of Maintenance Practices
- Assuring Process Consistency during Normal Operations
- Optimization of Your PM Practices

**Schedule:**

This course is only offered as a private offering at a client's site. Please contact PII for details about having our training provided at your site.



## **Course 18: Reliability Leadership for Manufacturing Excellence (1- or 2-Day)**

**Recommended prerequisites: None.**

Ron will review models for achieving reliability and manufacturing excellence that are patterned after some of the world's best companies. The very best plants are able to accomplish this through the application of a reliability strategy, which supports lean manufacturing, supply chain principles, and excellence in operations and maintenance, and assures them of being the low cost producer. This strategy ensures optimal production capability at a minimum sustainable cost. Costs are avoided by eliminating the "defects" which cause the costs being incurred in the first place, optimizing the work that adds value.

### ***Typical Course Candidates***

- Vice Presidents & Managers – Production, Maintenance and Executive
- Engineers – Reliability, Process, Safety
- Support Staff
- Anyone who leads or influences the direction and success of manufacturing plants

### ***What You Will Learn***

- Manufacturing Excellence and Reliability Principles
- Best practices in design, operation, maintenance practices – strengths and weakness of various approaches; and their role in manufacturing excellence
- Issues that are contributing to the losses from ideal, and more importantly, how to address the issues limiting your business performance through application of reliability principles, and without any capital investment
- How your practices compare to the best practices and benchmarks
- How to lead your company to business excellence, and manage day to day efforts
- Develop your improvement plan

### ***Take Home:***

- Comprehensive course notebook containing
  - Training material on all the tools included in the course
  - Take home appendices and workshops
- Certificate of Completion
- 0.7 CEUs & 0.7 COCs

### **Course Outline (1-day, 8:00 a.m. to 4:30 p.m.)**

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#### **Overview of Reliability Leadership for Manufacturing Excellence:**

- Introduction
- Manufacturing Business Excellence Overview – Low Cost Producer Profile
- Asset Utilization/Overall Equipment Effectiveness, Loss Accounting
- Safety and Reliability – Mutually Dependent
- Benchmarks
- Aligning the Marketing and Manufacturing Strategies

## **The Reliability Process: Design, Buy, Store, Install, Operate, and Maintain for Reliability**

- Designing for lowest life cycle cost vs. lowest installed cost
- Buying for supplier reliability and total cost of ownership
- Stores as a value adding asset and support function for reliability
- Installing/starting up with precision; avoiding infant mortality failures
- Operating with care, precision, consistency, and conformance

## **Maintaining with care and precision, and imputing reliability into the plant:**

- Preventive, Predictive, and Proactive Methods

## **Reliability Related Methods and Tools:**

- Reliability Centered Maintenance (RCM)
- Total Productive Maintenance (TPM)
- Case Studies – Combining RCM and TPM Principles – Business Level FMEA Leadership and Organizational Issues/Strategies

## **Strategy for Implementation**

- Leadership Principles
- Alignment and Teamwork
- Change Management

## **Success Stories**

## **Summary**

## **Potential Class Workshops:**

- Self-Assessments in: 1) Management support and plant culture; 2) Reliability-based design practices; 3) Reliability-based operating procedures; 4) PM maintenance practices; 5) Materials management practices; 6) Aligning the Marketing and Manufacturing Strategies
- Action Planning – Defining the Top 3 actions you're personally going to take; Integrate these into an overall strategy
- Other Available Options: Leadership and strategy development – manufacturing improvement plan, Process consistency/conformance exercise(s) – startup/shutdown & normal operation; Pump operating practices; Shift handover practices; Operator Care/PM practices; PM optimization exercises; Stores management practices; Development of capital projects and asset management strategy

## **Schedule:**

This course is only offered as a private offering at a client's site. Please contact PII for details about having our training provided at your site.

## Private Training

Private training is a very popular option among our clients. In fact, we teach more of our customized, private courses than public courses. A private course offers many advantages:

1. **Savings**

If you need to train more than 6 of your staff, then the overall training cost is substantially lower for a private course, especially when the travel cost of students is taken into account (courses are priced per day instead of per student, with recommended maximums per class). The course can be tailored to your schedule, provided at one or more of your locations, and combined with other topics. Multiple course discounts are also available.

2. **Larger Class Size**

For company-specific courses, it is usually easier to communicate the course subject to a larger group of people at the same time. Managers and others can observe (attend) key instructional portions of a course without hindering the learning process of the students. *Many companies see this bonus training as a pivotal factor in choosing a private offering of a course.*

3. **Custom Training Plan**

We will customize the training plan for a private course to meet your staff's needs. Typical customizations include:

- Adding materials specific to your companies internal programs, including adding sections that you want someone in your company to present
- Adjusting the overall course length and relative emphasis on each topic
- Skipping sections in our standard course that you do not feel are relevant

Because of our wide selection of pre-planned options for each standard course, there is usually no extra charge for customization. Highly customized or completely new courses can also be developed for a negotiable fee.

4. **Specific Workshops**

The most common customization option in private courses is to use your processes and procedures in the workshops, examples, and exercises. To accomplish this usually takes a few extra weeks of planning and coordination, but usually is no extra cost. In several cases, we have worked with a client for a few months to develop a company-specific exercise (such as a large case study for incident investigation training); but most clients find our generic examples, exercises, and case studies to be fine for their training needs.

5. **Confidentiality**

Since the attendees in your private course will only be from your company, they can freely discuss your company's unique problems. This results in more interaction on issues important to your company, compared to attending public courses.

6. **Follow-on Hands-on Training**

Another good reason to have private training is to keep our instructor around for a few more days or a couple of more weeks to coach your students through their first implementation in "real time" of what they have learned. We all know that classroom training has limitations; the on-the-job that our instructors can provide overcomes these limitations.

## Types of Private Courses

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**Onsite Training:** If you want a course customized for your needs or if you have a number of individuals who need the same training, **let us provide a course for you at your site.** This option focuses all the discussion and example problems specifically on the issues faced by a specific facility, maximizing the benefits to your workers.

**Regional Training:** If you have a number of facilities in one region of the country and want to save on travel costs, **let us provide a course in a central location.** You get all of the advantages of a private course (material customized to your company) and substantial cost savings through reduced travel costs and lower course costs.

## Helping you Decide if Private Courses are Right for Your Specific Need

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Are you undecided? Just give us a call at 1.865.675.3458 and we will discuss all the options for meeting your training needs. The meter is not running, so feel free to call. You can also e-mail Mr. Bridges at [wbridges@piii.com](mailto:wbridges@piii.com) to have him review your needs.

Each year, PII provides 40 to 60 private courses to more than a dozen organizations world-wide. Private courses are contracted by trade associations, corporations, and individual facilities. Industry sources suggest checking references before selecting a training provider. We suggest that you check 3 or more references. PII can provide a substantial list of confidential references for specific course topics, upon request. Call us at 1.865.675.3458 for more information.

The best way to decide if PII's training is the best option for your company is for you to send one or more "scouts" to a course open to the public (such as those described on page 2 of this catalog) offered in the USA or in Oman, Bahrain, Dubai [UAE], or elsewhere. This is a very low risk option since you can then apply one registration fee towards the purchase of a private course of the same type and duration, when it is later offered specifically for your company.

## PII Instructors Have Provided Customized Courses and Services for ...

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AEROJET  
American Electric Power (AEP), USA  
ARAMCO  
ASSE-MEC  
BP, USA  
Bristol-Myers-Squibb  
China Light & Power, Hong Kong  
ConocoPhillips  
Cook Composites and Polymers  
Covidien  
Danieli (Italy)  
DuPont  
ENOC (Dubai)  
Enogex  
EQUATE Chemicals (Kuwait)  
Georgia-Pacific  
GTI, Tampico, Mexico  
International Specialty Products  
IPSL (Trinidad)  
J. Ray McDermott (Dubai, UAE)  
KordSA  
MERCK

NOVA Chemical (and Ineos-NOVA)  
Parker, USA  
PETRONAS (Malaysia)  
PETRORABIGH (Saudi Arabia)  
Phoenix Park Liquefied Gas Ltd, Trinidad  
Pictsweet, USA  
POSCO, Korea  
S.W.I.F.T., USA  
SABIC (nearly all affiliates; Saudi Arabia)  
SAHARA (Al Waha), Saudi Arabia  
Seimens (Austria)  
Shaw Group  
SIPCHEM (Saudi Arabia)  
SUMCO  
Sun Chemical  
Swiss Re, Zurich, Switzerland  
TORAY Plastics  
US Department of Energy (DOE) – various sites  
US Navy  
VAMH (Sandvik; Germany and Italy)  
Voescht-Alpine (Austria)

**And more than 100 other Clients – ask for references**

## **Additional Comments on Selecting PII for Training Assistance**

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Please consider the following when evaluating the value of our public and private training services:

1. PII employees world experts in PSM consulting and related training; our courses reflect the very latest in best practices for controlling the various aspects of process safety and system reliability.
2. These course topics have been taught in various forms by the staff at PII for over 10 years (on average). Since PII was formed, all of the course topics have been newly authored using unique materials to reflect not only the best practices in the industry, but also to provide the attendees with the most comprehensive text on each topic (saving you expense related to purchasing of additional textbooks on each topic).
3. PII continually updates and improves its courses to stay current with best practices; your company will benefit from this at no extra charge.
4. PII courses are developed and taught by experts who continually help companies effectively implement PSM; we know what works in practice.
5. Our instructors teach all of these courses for many companies around the world; you will greatly benefit from this accumulated knowledge.
6. During the teaching and development of a course, we can and will comment on related management systems at your company and offer suggestions in writing for improvements. This is an enormous value-added feature of our training for organizations such as yours and could save your company many thousands of dollars in consulting fees if this service were purchased separately. We will only charge extra for such services if our instructor is not able to develop such improvements during preparation and/or delivery of a contracted training service; any extra charges will be pre-approved by you.
7. In most cases, PII can incorporate examples from your company into the courses as exercises and workshops for no extra fee, thereby minimizing development cost.

For information on having PII provide a course at your site(s), contact the PII at 1.865.675.3458.

## Expertise of the Process Improvement Institute

Our consultants and instructors are internationally recognized experts in risk assessments, risk management systems, PSM, and loss prevention. They are among the very best in the field because they combine complete theoretical understanding of their topic with the experience that is necessary to discriminate between something that works only in theory and something that works in practice.

Our instructors have trained over 8000 in PSM-related topics, including over 3800 investigators, 3700 PHA leaders, 3000 PSM experts and auditors, 1200 procedure writers, and many others on other topics.

Our personnel have led over 500 PHAs (qualitative risk assessments or HAZOPs; most of these were of entire units), over 150 major investigations, and over 60 major PSM audits. They have developed and implemented effective MOC programs, procedure writing protocols, and hazard review (risk assessment) methodologies. They are among the most experienced PSM experts and instructors in the world.



They have **served as chair or co-chair of 11 major international conferences on PSM** and have authored or co-authored over 50 articles/papers on PSM topics and were co-authors or primary authors of the following definitive textbooks for AIChE's Center for Chemical Process Safety (CCPS):

- **Guidelines for Conditional Modifiers and Initiating Events for LOPA**, CCPS/AIChE, 2013 [pending] (Mr. Bridges is a committee member and contributing author; this will be an essential supplement to the original LOPA book which was co-authored by Mr. Bridges).
- **Guidelines for Independent Protection Layers and Initiating Events**, CCPS/AIChE, 2013 [pending] (Mr. Bridges is the principal author; this will be an essential supplement to the original LOPA book which was co-authored by Mr. Bridges).
- **Guidelines for Hazard Evaluation Procedures**, CCPS/AIChE, 2008 (3<sup>rd</sup> Edition) (this is the definitive text on performing PHAs; Mr. Bridges and Mrs. Tew were contributing authors)
- **Essential Practices for Managing Reactive Chemicals Hazards**, CCPS/AIChE, 2003 (Mr. Norsworthy was a committee member and contributing author)
- **Guidelines for Investigating Chemical Process Incidents**, 2003 (2<sup>nd</sup> Edition) (this is the definitive textbook on investigation; Mr. Bridges was a primary author)
- **Guidelines for Analyzing and Managing the Security Vulnerabilities of Fixed Chemical Sites**, CCPS/AIChE, 2002 (Mr. Norsworthy was a committee member and contributing author)
- **Layer of Protection Analysis**, CCPS/AIChE, 2001 (Mr. Bridges was a primary author; this is the definitive text on semi-quantitative risk assessment)
- **Guidelines for Hazard Evaluation Procedures**, CCPS/AIChE, 1991 (2<sup>nd</sup> Edition) (this is the definitive text on performing PHAs; Mr. Bridges was a contributing author)

They have co-authored six related standards for the US Department of Energy, as well as authoring or co-authoring the definitive papers on:

- How to address human error/factors during PHAs (and HAZOPs)

- How to analyze procedure steps for hazards/risks of performing steps incorrectly
- How to make your PHAs comply with US OSHA's PSM requirements
- What are the Costs/Benefits of PSM compliance
- How to get Near Misses Reported and Investigated
- How to write effective operating and maintenance procedures
- How to develop troubleshooting guides from HAZOP tables
- How to implement an effective LOPA program
- How to perform incident investigations and root cause analyses

A full résumé of each expert is available upon request; and we can provide you with a long list of references (your peers) that use us and can attest to the value of our services.

## Course Registration Form

Fax completed form to +1-865-622-6800

Course Information		2013 Rev 5
Course:		
Dates of Course:		
Payment Method:	<input type="radio"/> Check <input type="radio"/> Purchase Order	<input type="radio"/> Credit Card
	Check # or PO #	Credit Card Information:
		Type: <input type="radio"/> Visa <input type="radio"/> MC <input type="radio"/> AMEX
		Card #
		Exp. Date:
		Name on Card:
Registrant Information		
First Name:		Middle Initial:
Last Name:		
Title:		
Company:		
Department:		
Mailing Address:		
Street Address		
City:		State:
Postal Code:		Country:
Telephone:		Fax:
Cell/Mobile:		E-mail:
Comments:		

**Note:** If registering 4 or more attendees for the same course, please indicate this in the comments section of the Registration Form to ensure you receive a 15% discount.

See page 6 for details of *Fees and Payments* and other conditions.

**Note:** Please do not make any nonrefundable travel arrangements until your course is confirmed to be held. You will receive a confirmation of the course no less than 2 weeks prior to the course; this will be sent by either e-mail to [wbridges@piii.com](mailto:wbridges@piii.com) or fax.



## Instructors

The Process Improvement Institute (PII) instructors have trained more than 7000 technical and management staff in how to effectively implement PSM, safety management systems, and reliability programs. If you do not already know us, come to one of our many courses offered publicly to check us out first-hand.

### William G. Bridges (Bill)

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Bill is President of PII. Formerly, he was a director of the Risk Consulting Division of ABS Consulting (formerly JBF Associates and EQE International). He is considered one of the leading authorities on process safety engineering, risk management, and human error prevention. He has a Bachelor and Masters degree in Chemical Engineering and he has over 30 years of chemical industry experience in process engineering, process/product development, management, safety evaluation, and operations. His last position in the chemical industry was as a chemical plant manager. Bill has helped many companies in the petroleum, petrochemical, plastic and chemical process industries develop, implement and assess PSM and risk management programs. Bill has taught PSM related courses, including process hazard analysis/HAZOP leadership, incident investigation/RCA, and management of change (MOC) since 1987. He has primary and co-author of many AIChE/CCPS textbooks that are considered "industry best practices" such as LOPA and IPLs.



### Gerald Burch

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Gerald has over 30 years of hands-on manufacturing experience, most of this in the chemical industry as a plant manager at Hercules, Engelhard, BASF, and Chemtrade. He has led the implementation and enhancement of process safety management systems at all of the sites he has managed. Gerald was an early adopter and champion of the Responsible Care codes of management practices, serving on various committees with the LaPorte (TX) Plant Manager's Network, the East Harris County (TX) Manufacturers Council, and the Texas Chemical Council.

Gerald is a skilled team facilitator of continuous improvement projects (trained in lean manufacturing techniques, six sigma, human performance improvement, and process safety) and he has managed large scale, international change and integration projects following the sale and acquisition of facilities. He is a skilled PSM auditor and instructor and has experience implementing all elements of process safety. Gerald has taught incident investigation and root cause analysis and process safety and safety leadership course. He has a BS in Chemical Engineering from the University of Virginia and a MBA in Leadership from William Carey University. He has served on the Board of Directors of the George Washington University Center for the Study of Learning and he led Virginia's High Performance Learning Network.



## **Dr. Tony Clark**

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Dr. Tony Clark began his career teaching chemical engineering to HND and B.Eng (Hons.) students at the Polytechnic of Wales, he then moved into consultancy and has more than 20 years experience in the fields of safety, loss prevention and environmental assessments. His work has included preparation of safety reports and QRA studies for a variety of onshore and offshore oil and gas installations, chemical and petrochemical plants both in the UK and overseas, and in particular the Middle East. In the early 1990's he was seconded to BP Exploration in Scotland where he was a safety coordinator for a large offshore gas development. Tony's training experience includes devising and presenting a training program covering the techniques of HAZOP, Hazard Analysis, and elements of PSM to the Chinese in Xinjiang. He has delivered hazard assessment and emergency planning training to Indian engineers, risk assessment and environmental analysis training in the Middle East. Tony continues to deliver consulting and training services to clients in UK, Europe, and the Middle East, including LOPA analysis, PHAs, HAZOPs, quantitative risk assessments, SIL verification, etc.



## **Dr. Ginette Collazo-Ramos**

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Ginette has over 12 years of experience in the Pharmaceutical/ Biopharmaceutical Industries. She has worked for companies like Wyeth, Schering Plough, Johnson & Johnson, and Bristol Myers Squibb leading the technical training, regulatory training, and organizational development efforts. Ginette has a Ph.D. in Industrial-Organizational Psychology from the Interamerican University of Puerto Rico. The first half of her career was focused on the development and implementation of training programs and employee performance improvement initiatives. The last years she has been focusing on Human Reliability and Productivity Improvement initiatives and has achieved up to 60% reduction on human error events related to product quality, and up to 50% reduction on departments allocated budget by increasing efficiencies and simplifying processes.



She has authored various publications on Human Reliability and Employee Productivity topics including "Model for Collective Behavior Modification in Organizations" and "Coding, Monitoring, and Trend Analysis on Human Error Investigations" and "Creating an Effective CAPA Effectiveness Program." Having implemented Human Reliability programs in various industries, she understands what works and what doesn't when trying to change a culture from an error tolerant environment to an error free organizational community. She has designed and delivered hundreds of courses through her career including, Incident Investigation/Root Cause Analysis (RCA) Leadership,

Instructors Qualification Program, Skill-Based Training Program for SME's, Human Error Prevention for Operators, and Supervisors Academy for an Error Free Environment.

### **Ron Moore**

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Ron is Managing Partner of The RM Group, Inc., Knoxville, TN. He travels worldwide working with manufacturing companies in North America, Europe, Australia, Africa, and the Far East.

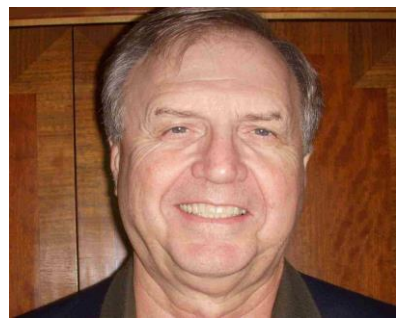
Ron is author of the book *Making Common Sense Common Practice: Models for Manufacturing Excellence*, which describes one company's journey to world class performance. His latest book is *What Tool? When? Selecting the Right Manufacturing Improvement Tools*, 2006. He has also written over 30 journal articles worldwide. Ron served for five years as President of Computational Systems, Inc (CSI), the leading supplier of industrial instruments and software for equipment condition monitoring technologies. During his five-year tenure, the company grew at 30% per year, while concurrently maintaining healthy profits and cash position, and a strong balance sheet. He holds a BSME, MSME, MBA, PE, and CMRP.



### **Mickey Norsworthy**

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Mickey has more than 40 years of process engineering experience, with over 25 years in operations and operations management. He was plant manager of three different facilities involved in the large scale production of highly toxic and flammable chemicals. He has led many process hazard analyses (PHAs), including a great many management of change reviews. He has led many investigations and root cause analysis (RCAs) and several large scale process safety audits and assessments. He was a principal trainer for PHA leadership and process safety management (PSM) courses within Arch Chemical Company for several years and had overall responsibility for PSM implementation at both the plant and corporate levels of Olin Chemicals and Arch Chemicals. He has B.S. Chemical Engineering. He has served on book writing committees for CCPS/AIChE and he is an active member of NFPA, serving on several standards committees.



### **Greg Smith**

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Greg has more than 16 years of process engineering experience, with 25 years experience overall. He has extensive hands-on experience in chemical operations, which includes responsibility for effectively implementing process safety at sites for Cytec, Degussa, and Hoechst Celanese. His last position in the chemical industry was as operations manager. He also has experience in performing process hazard analyses (PHAs), investigations, and audits, and he has experience implementing behavior-based safety programs and incident reporting systems. He has extensive experience in helping clients implement process safety. He has similar experience with roll-out and



implementation of Site Security and Site Vulnerability Assessments; for instance he led the Synthetic Organic Chemical Manufacturer's Association (SOCMA) efforts in security, management systems development, training, and member outreach. He is currently leading PHAs and PHA Revalidations and he is also teaching PHA Leadership courses and other topics for PII. He has B.S. in Chemical Engineering.

### **Revonda Tew**

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Revonda has 20 years of experience in the chemical industry, including process development, process engineering, and process safety management and evaluation. Revonda has a B.S. in Chemical Engineering and an MBA. In the early 1990's Revonda was PSM coordinator at a large chemical manufacturing facility, where she authored and implemented policies and procedures to address industry, regulatory, and company standards. She has significant hands-on experience having led and documented many PHAs, numerous management of change (MOC) risk reviews, several investigations, and PSM audits. She has also developed customized training materials for various topics, including MOC, PHA leadership, and PSM auditing, and she is a co-instructor for these topics and for incident investigation. Revonda has experience with both community relations and crisis management and is currently involved in LEPC activities.



### **Jeff Woody**

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Mr. Woody has 25+ years of engineering and safety management experience supporting various nuclear and chemical operations including nuclear weapons production, facility decommissioning, environmental restoration projects, and chemical plant operations and safety management. He has a B.S. in Civil Engineering. During Mr. Woody's career, he served as a Senior Safety Engineer with US Department of Energy's (DOE) Office of Defense Programs (DP), where he performed hazard and accident analysis at major nuclear installations. For the past ten years, he has been a consultant providing regulatory support, safety analysis, and training. He has been part of the development team for many of the definitive standards with DOE on hazard identification/characterization, and integrated process safety management /environmental systems. He has developed and delivered numerous training classes to hundreds of individuals on various safety-related topics, including Integrated Safety Management, Technical Safety Requirements, and Safety Analysis Review Process.

