MEASURE WHAT YOU ALREADY DO
How to Get Started with Process Safety
Volume 3
ENDORSEMENT
This document was developed by Energy Safety Canada through a collaboration of industry professionals. We gratefully acknowledge the support of the following organizations in the development of this document:

- Canadian Association of Geophysical Contractors (CAGC)
- Canadian Association of Oilwell Drilling Contractors (CAODC)
- Canadian Association of Petroleum Producers (CAPP)
- Canadian Energy Pipeline Association (CEPA)
- Explorers and Producers Association of Canada (EPAC)
- Petroleum Services Association of Canada (PSAC)

ABOUT ENERGY SAFETY CANADA
Energy Safety Canada is the oil and gas industry’s advocate and leading resource for the continuous improvement of safety performance. Our mission is to help companies achieve their safety goals by providing practices, assessment, training, support, metrics and communication.

AVAILABILITY
This document as well as future revisions and additions, is available from:

Energy Safety Canada
150 - 2 Smed Lane SE
Calgary, Alberta T2C 4T5
Phone: 403 516 8000
Toll Free: 1 800 667 5557
Fax: 403 516 8166
EnergySafetyCanada.com

ACKNOWLEDGEMENT
Energy Safety Canada gratefully acknowledges the many individuals who volunteered their time and effort to complete this document.

DISCLAIMER
This document is intended to be flexible in application and provide guidance to users rather than act as a prescriptive solution. Recognizing that one solution is not appropriate for all users and situations, it presents generally accepted guidelines that apply to industry situations, as well as recommended practices that may suit a company’s particular needs. While we believe that the information contained herein is reliable under the conditions and subject to the limitations set out, Energy Safety Canada does not guarantee its accuracy. The use of this document or any information contained will be at the user’s sole risk, regardless of any fault or negligence of Energy Safety Canada and the participating industry associations.

COPYRIGHT/RIGHT TO PRODUCE
Copyright for this document is held by Energy Safety Canada, 2019. All rights reserved. Energy Safety Canada encourages the copying, reproduction and distribution of this document to promote health and safety in the workplace, provided that Energy Safety Canada is acknowledged. However, no part of this publication may be copied, reproduced or distributed for profit or other commercial enterprise, nor may any part be incorporated into any other publication, without the written permission of Energy Safety Canada.
PREFACE

PURPOSE
The purpose of the How to Get Started with Process Safety library of documents is to provide practical steps for companies in the oil and gas industry managing process safety risks (as “process safety” risks). While managing risks that are process safety risks is not new to the industry, for some companies managing these risks under the banner of process safety is new. This library is designed to help companies rapidly understand what is meant by process safety and assist them in identifying their most significant process safety risk as well as their existing management components and operational practices that fall under process safety management.

This volume, Measure What You Already Do, provides an introduction to process safety management (PSM) systems and how a company might use a PSM standard to arrive at an initial measurement of what they are already doing to manage their process safety risks.

HOW TO USE THIS GUIDELINE
The intended audience for this document is senior management or senior operational managers who have risk management responsibilities. This would also include, but not be limited to, those specifically assigned senior roles in either process safety or, more likely, assigned health, safety, and environmental (HSE) roles. It should also be of interest to anyone assigned the task of developing and/or implementing process safety for an organization in the oil and gas industry.

LIMITATIONS
This document does not represent an industry standard on process safety. Process safety as a discipline and process safety management practices are established in a number of well-known standards. This document and the How to Get Started library are limiting themselves to offering advice on the practical demands of process safety implementation.
# TABLE OF CONTENTS

1.0  What is Process Safety Management? ................................................................. 2
2.0  Comparing Your Existing Efforts with a PSM Standard ........................................ 3
3.0  Practical Tools for the CSChE PSM Standard ....................................................... 4
4.0  The PSM Gap Analysis Examples ........................................................................ 6
1.0 What is Process Safety Management?

The concept of Process Safety Management, or PSM, has been around for several decades. Here is a technical definition of PSM:

*Process Safety Management is the application of management principles and systems to the identification, understanding, and control of process hazards to prevent process-related injuries and incidents.*

(Taken from Process Safety Management Guide, 4th ed., CSChE)

Essentially, PSM uses systems and management principles to address process hazards.

PSM Standards

*What is a PSM Standard?*

A PSM standard is a document that outlines how to combine management systems and programs in order to comprehensively manage process safety risks. Typically, a PSM captures these systems and programs under a series of elements.

Several standards are available. They are all slightly different in terms of how they label and organize the PSM elements. However, if a company uses any of the standards below, it usually has nearly all the systems and programs required by the other standards.

Here are five example PSM standards:

- CSChE: Process Safety Management Standard
- CSA: Z767 Process Safety Management
- AIChE CCPS: Guidelines for Risk Based Process Safety
- Energy Institute (UK): Process Safety Management (PSM) home page
- US Department of Labor OSHA: Process Safety Management

Energy Safety Canada and its industry association members are not endorsing any one PSM standard at this point in time. For the rest of this guideline, we will reference the Canadian Society for Chemical Engineering (CSChE) PSM standard for practicality.

The CSChE PSM Standard

The Canadian Society for Chemical Engineering (CSChE) PSM Division has adopted a twelve element PSM standard originally developed by the CCPS (Center for Chemical Process Safety). While the CCPS moved to a new risk-based twenty element approach in 2007, the CSChE PSM Division has retained the original, shorter standard.

For some companies, the CSChE PSM Standard may be ideal. It is freely available online for companies to download and use. The CSChE has also provided ready-to-use free tools and audit protocols for companies or facilities just starting their PSM journey.
 CSA PSM Standard

Please be aware that the Canadian Standards Association (CSA) has published a standard (Z767-17 Process safety management) on process safety management. This standard refers to 16 elements and can be purchased here.

<table>
<thead>
<tr>
<th>12 Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountability: Objectives and Goals</td>
</tr>
<tr>
<td>Human Factors</td>
</tr>
<tr>
<td>Process Knowledge and Documentation</td>
</tr>
<tr>
<td>Training and Performance</td>
</tr>
<tr>
<td>Capital Project Review and Documentation</td>
</tr>
<tr>
<td>Incident Investigation</td>
</tr>
<tr>
<td>Process Risk Management</td>
</tr>
<tr>
<td>Company Standards, Codes and Regulations</td>
</tr>
<tr>
<td>Management of Change</td>
</tr>
<tr>
<td>Audits and Corrective Actions</td>
</tr>
<tr>
<td>Process and Equipment Integrity</td>
</tr>
<tr>
<td>Enhance of Process Safety Knowledge</td>
</tr>
</tbody>
</table>

Figure 1: The CSChE PSM Standard Elements

2.0 Comparing Your Existing Efforts with a PSM Standard

Measure What You Already Do

Your company’s existing management systems and programs probably already fulfil many of the elements in a PSM standard.

Measuring what you already do is the first step to evaluating and improving process safety performance. The goal of performing a gap analysis is to identify which of your company’s systems already align with accepted practice in process safety management.

The Value of a Gap Analysis

The value of a gap analysis will depend on your company’s operations and current
management systems and programs.

Organizations that have completed a gap analysis report the following benefits:

- Companies discover they have more “process safety” related systems in place than they initially assumed.
- “Process safety” and PSM are demystified: now you can apply the theory to your own real-world operations and systems.
- The domain of “safety” is expanded beyond front line worker injuries to matters that lie at the heart of operations. The singular focus on managing personal injury hazards (often with the onus on the front-line worker and their actions) now becomes a broader focus.
- With a broader focus, safety now includes business and management personnel that used to be seen as “outside the scope of safety management”. For example, procurement and maintenance operations are now just as “safety critical” as the morning tailgate safety meeting.
- The link between senior management and safety becomes more obvious than if you think of safety primarily as “personal safety”. As more operations are linked to safety, the need for senior management sponsorship and support becomes clear.
- Taking a look at process safety can help you ask: “Are our current efforts doing enough to manage process safety risk? Should we be doing more?”
- In the same way, the gap analysis may reveal inefficiencies. You may need to rebalance resources if you find duplicate efforts in places and serious gaps elsewhere.

**Keeping It Simple**

PSM standards are created with very complex, high hazard process facilities in mind. Your company may not match that degree of complexity in its equipment and operations.

Keep in mind that each company varies and PSM elements should be fit for purpose. A complex system that is poorly understood and not well-used will not benefit your operations. A simple, carefully executed and well-understood approach may be more valuable.

In an initial gap analysis, keep it simple. If an existing practice or system is a reasonable match to a PSM element, place it there. The goal is to capture all existing process safety related management systems and programs. In the future, working forward from existing programs may prevent duplicate efforts or reinventing the wheel.

### 3.0 Practical Tools for the CSChE PSM Standard

One of the reasons the CSChE PSM Standard is included here is that it already provides freely available resources online (see PSM Publications). If your company is using the CSChE PSM Standard to measure existing PSM maturity, review all of the following before beginning the process.
- Process Safety Management Standard (1st ed)
- Process Safety Management Standard Audit Protocol
- PSM Audit Protocol Workbook

**Figure 2: The CSChE PSM Standard versus Guide**

**The CSChE PSM Guide (4th ed)**

**Questions on Element 1 ACCOUNTABILITY: OBJECTIVES AND GOALS**

**Essential**

(a) Are responsibilities clearly defined and communicated, with those responsible held accountable?

(b) Is there a system which designates the accountability for safe work at the site, including contract personnel?

**Enhanced**

(c) Is there a policy statement expressing management’s commitment to process safety and prevention?

(d) Is the system for accountability designed to handle possible exceptions by specifying how decisions are made?

(e) Does the system feature performance metrics and goals for process safety and monitor and manage performance according to those goals?

(f) Does the system attempt to benchmark and encourage a safety culture?

**Comprehensive**

(g) Are employees recognized for their personal efforts in the continual improvement of process safety?

(h) Is there clear accountability for maintaining the integrity of the facility’s assets?

(i) Is accountability continuous (i.e. regardless of changes in personnel, production schedules, organizational structure, etc)?

(j) Does the system ensure effective implementation of all items covered by the questions under PSM Guide element 1 (Accountability, Objectives and Goals)?

(k) Does the system ensure any systemic deviation from approved safe work practices and normal operation within prescribed limits is periodically reviewed, acknowledged and addressed?

(l) Is there active involvement and exchange of PSM knowledge with industry PSM groups?

(m) Is there active involvement, relative to site and company capability, in promoting and supporting adoption of PSM by other process industry sites in Canada?
4.0 The PSM Gap Analysis Examples

This section will provide some practical examples of how companies have conducted a gap analysis using the twelve CSChE elements and their existing management systems. Please note these examples are not specific to one company and may look different from one organization to the next.

PSM Gap Analysis Example

Scenario:
A small oil production company with well sites, battery facilities and some pipelines. The company employs operations and maintenance personnel, plus contract staff for construction work and turnarounds, and is run by a small management team.

Tools and Resources:
- CSChE Process Safety Management Guide
- Excel workbook or other means to track results (whiteboard, notebook)
- Staff from operations, maintenance, management and regular contractors (1-2 people from each group)

Gap Analysis Process:
1. The team read through each element in the Process Safety Management Guide and then answered “yes” or “no” to each question. They included comments in their excel workbook about specific documents, activities or programs that related to each question for that element.
2. Once all the questions were answered for an element, they scored that element in terms of “complete” or “not complete” for each of the three components (Essential, Enhanced and Comprehensive). They also noted the specific questions where gaps were found.
3. When all the elements were complete, they tallied the information for all the elements. See example table below.
4. Using the compiled information, they prioritized the gaps based on company requirements. For example, this company prioritized items related directly to safe day-to-day operations as the most urgent, followed by incident investigations, training and management expectations. Capital project requirements were deemed a lower priority as the company has no plans to execute capital projects this year.
5. They assigned specific actions, deadlines and accountabilities for each gap item, in order of priority, to the team members present. They tracked this information along with item completion inside their excel workbook.
6. The team decided to focus on filling the gaps noted under Essential first, followed by Enhanced and then Comprehensive. They set a target to be compliant to all Essential requirements by year end, and to be compliant to all Enhanced items by the end of the following year.
<table>
<thead>
<tr>
<th>Element</th>
<th>Essential</th>
<th>Enhanced</th>
<th>Comprehensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountability, Objectives and Goals</td>
<td>C</td>
<td>NC</td>
<td>all</td>
</tr>
<tr>
<td>Process Knowledge and Documentation</td>
<td>NC</td>
<td>b, c</td>
<td>NC</td>
</tr>
<tr>
<td>Capital Project Review and Design Procedures</td>
<td>NC</td>
<td>c, d</td>
<td>NC</td>
</tr>
<tr>
<td>Process Risk Management</td>
<td>NC</td>
<td>a, d</td>
<td>NC</td>
</tr>
<tr>
<td>Management of Change</td>
<td>NC</td>
<td>a(i), b, d</td>
<td>NC</td>
</tr>
<tr>
<td>Process and Equipment Integrity</td>
<td>NC</td>
<td>a(iv), b(i), b(v), c</td>
<td>NC</td>
</tr>
<tr>
<td>Human Factors</td>
<td>NC</td>
<td>a, b</td>
<td>NC</td>
</tr>
<tr>
<td>Training and Performance</td>
<td>NC</td>
<td>d</td>
<td>b(i0), b(ii), c</td>
</tr>
<tr>
<td>Incident Investigation</td>
<td>NC</td>
<td>d</td>
<td>a</td>
</tr>
<tr>
<td>Company Standards, Codes and Regulations</td>
<td>C</td>
<td>NC</td>
<td>a</td>
</tr>
<tr>
<td>Audits and Corrective Actions</td>
<td>NC</td>
<td>all</td>
<td>NC</td>
</tr>
<tr>
<td>Enhancement of Process Safety Knowledge</td>
<td>NC</td>
<td>b(iii), b(vi), b(vii)</td>
<td>NC</td>
</tr>
</tbody>
</table>

C = Complete
NC = Not Complete
CALGARY
T 403 516 8000  5055 11 Street NE
F 403 516 8166  Calgary, AB T2E 8N4

NISKU
T 780 955 7770  1803 11 Street
F 780 955 2454  Nisku, AB T9E 1A8

FORT MCMURRAY
T 780 791 4944  Box 13 - 8115 Franklin Avenue
F 780 715 3945  Fort McMurray, AB T9H 2H7

BRITISH COLUMBIA
T 250 784 0100  2060 - 9600 93 Avenue
F 250 785 6013  Fort St. John, BC V1J 5Z2

SASKATCHEWAN
T 306 842 9822  208 - 117 3 Street
F 306 337 9610  Weyburn, SK S4H 0W3

Info@EnergySafetyCanada.com
Enrolment Services and Certificate of Recognition:
1 800 667 5557

EnergySafetyCanada.com