ENERGY SAFETY CANADA

MEASURE WHAT YOU ALREADY DO

How to Get Started with Process Safety
Volume 3

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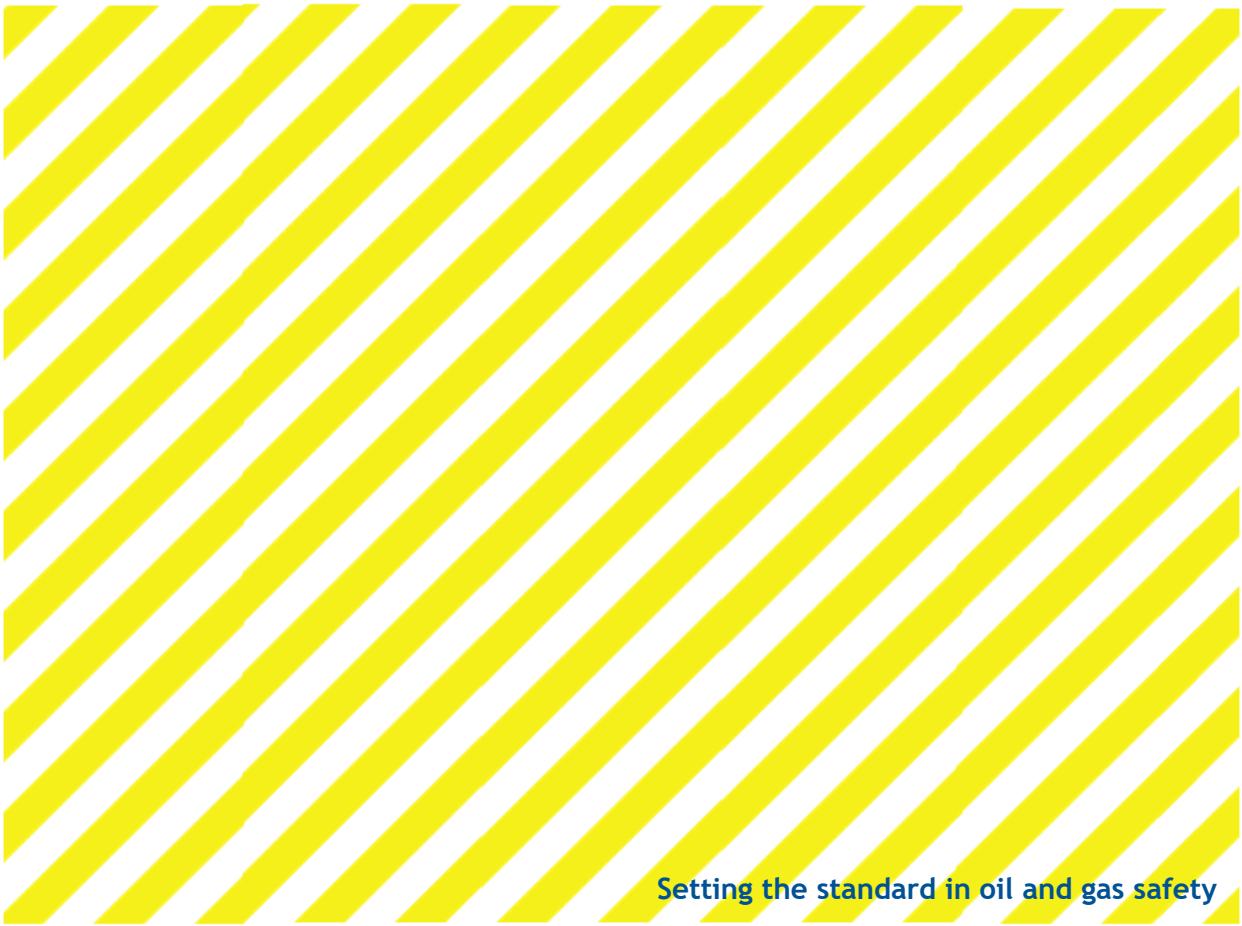

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- Canadian Association of Geophysical Contractors (CAGC)
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- Canadian Energy Pipeline Association (CEPA)
- Explorers and Producers Association of Canada (EPAC)
- Petroleum Services Association of Canada (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

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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.

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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 DOCUMENT

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.

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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.

12 Elements	
Accountability: Objectives and Goals	Human Factors
Process Knowledge and Documentation	Training and Performance
Capital Project Review and Documentation	Incident Investigation
Process Risk Management	Company Standards, Codes and Regulations
Management of Change	Audits and Corrective Actions
Process and Equipment Integrity	Enhance of Process Safety Knowledge

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 fulfill 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 Gao 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.

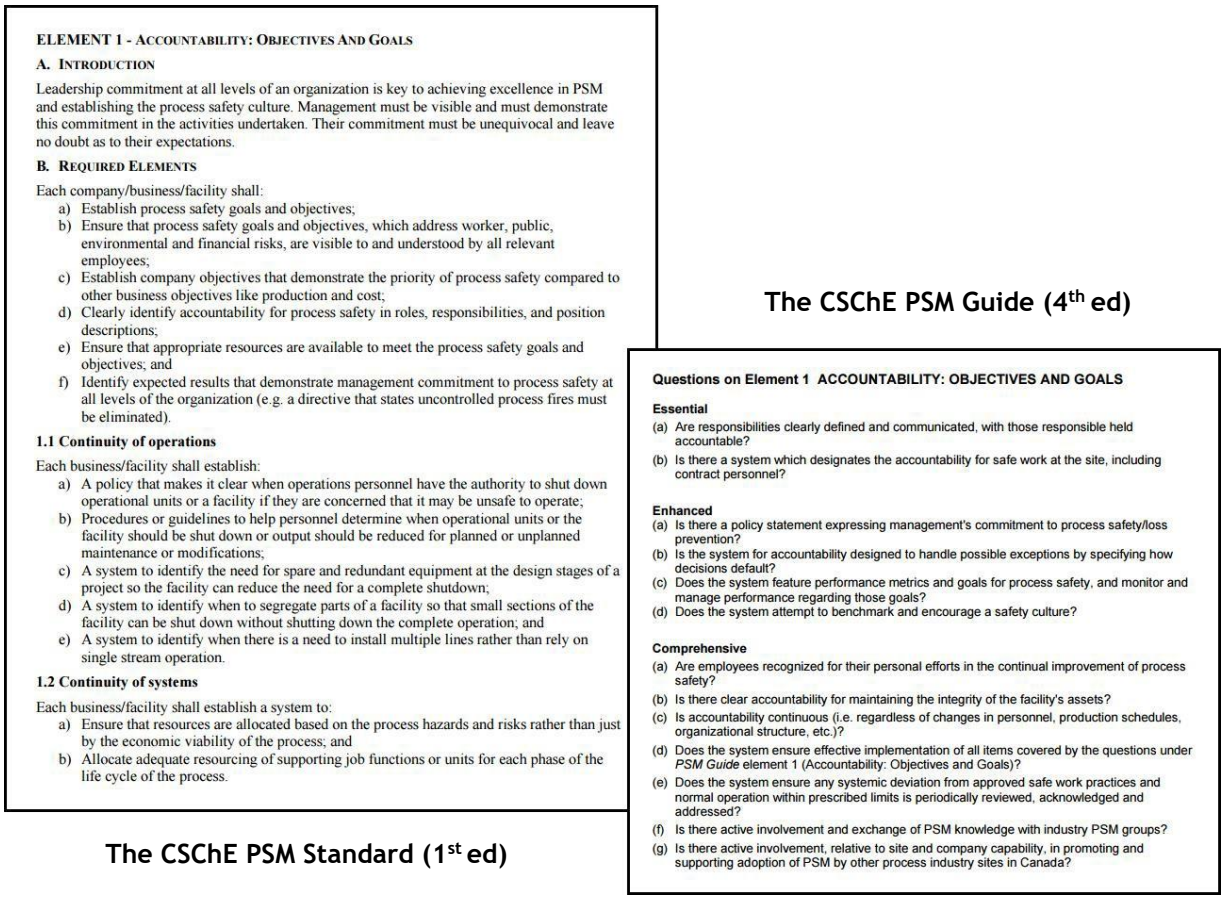
Keep in mind that each company varies and PSM elements should be fit for purpose. A complex system that is poorly understood and not well-used will not benefit your operations. A simple, carefully executed and well-understood approach may be more valuable.

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 Guide (4th ed)
- Process Safety Management Standard Audit Protocol
- PSM Audit Protocol Workbook



ELEMENT 1 - ACCOUNTABILITY: OBJECTIVES AND GOALS

A. INTRODUCTION

Leadership commitment at all levels of an organization is key to achieving excellence in PSM and establishing the process safety culture. Management must be visible and must demonstrate this commitment in the activities undertaken. Their commitment must be unequivocal and leave no doubt as to their expectations.

B. REQUIRED ELEMENTS

Each company/business/facility shall:

a) Establish process safety goals and objectives;
b) Ensure that process safety goals and objectives, which address worker, public, environmental and financial risks, are visible to and understood by all relevant employees;
c) Establish company objectives that demonstrate the priority of process safety compared to other business objectives like production and cost;
d) Clearly identify accountability for process safety in roles, responsibilities, and position descriptions;
e) Ensure that appropriate resources are available to meet the process safety goals and objectives; and
f) Identify expected results that demonstrate management commitment to process safety at all levels of the organization (e.g. a directive that states uncontrolled process fires must be eliminated).

1.1 Continuity of operations

Each business/facility shall establish:

a) A policy that makes it clear when operations personnel have the authority to shut down operational units or a facility if they are concerned that it may be unsafe to operate;
b) Procedures or guidelines to help personnel determine when operational units or the facility should be shut down or output should be reduced for planned or unplanned maintenance or modifications;
c) A system to identify the need for spare and redundant equipment at the design stages of a project so the facility can reduce the need for a complete shutdown;
d) A system to identify when to segregate parts of a facility so that small sections of the facility can be shut down without shutting down the complete operation; and
e) A system to identify when there is a need to install multiple lines rather than rely on single stream operation.

1.2 Continuity of systems

Each business/facility shall establish a system to:

a) Ensure that resources are allocated based on the process hazards and risks rather than just by the economic viability of the process; and
b) Allocate adequate resourcing of supporting job functions or units for each phase of the life cycle of the process.

The CSChE PSM Standard (1st 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

(a) Is there a policy statement expressing management's commitment to process safety/loss prevention?
(b) Is the system for accountability designed to handle possible exceptions by specifying how decisions default?
(c) Does the system feature performance metrics and goals for process safety, and monitor and manage performance regarding those goals?
(d) Does the system attempt to benchmark and encourage a safety culture?

Comprehensive

(a) Are employees recognized for their personal efforts in the continual improvement of process safety?
(b) Is there clear accountability for maintaining the integrity of the facility's assets?
(c) Is accountability continuous (i.e. regardless of changes in personnel, production schedules, organizational structure, etc.)?
(d) Does the system ensure effective implementation of all items covered by the questions under *PSM Guide* element 1 (Accountability: Objectives and Goals)?
(e) Does the system ensure any systemic deviation from approved safe work practices and normal operation within prescribed limits is periodically reviewed, acknowledged and addressed?
(f) Is there active involvement and exchange of PSM knowledge with industry PSM groups?
(g) Is there active involvement, relative to site and company capability, in promoting and supporting adoption of PSM by other process industry sites in Canada?

The CSChE PSM Guide (4th ed)

Figure 2: The CSChE PSM Standard versus Guide

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.

		Essential		Enhanced		Comprehensive		
Element		Score	Gaps	Score	Gaps	Score	Gaps	Priority
1	Accountability, Objectives and Goals	C		NC	a, b, c, d	NC	all	2
2	Process Knowledge and Documentation	NC	b, c	NC	all	NC	all	1
3	Capital Project Review and Design Procedures	NC	c, d	NC	all	NC	all	3
4	Process Risk Management	NC	a, d	NC	all	NC	all	1
5	Management of Change	NC	a(i), b, d	NC	all	NC	all	1
6	Process and Equipment Integrity	NC	a(iv), b(i), b(v), c	NC	all	NC	all	1
7	Human Factors	NC	a, b	NC	all	NC	all	3
8	Training and Performance	NC	d	NC	b(i0, b(ii), c	NC	all	2
9	Incident Investigation	NC	d	NC	a	NC	all	2
10	Company Standards, Codes and Regulations	C		NC	a	NC	all	3
11	Audits and Corrective Actions	NC	all	NC	all	NC	all	2
12	Enhancement of Process Safety Knowledge	NC	b(iii), b(vi), b(vii)	NC	all	NC	all	3

C = Complete
NC = Not Complete

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