



Canadian Society for Chemical Engineering | ***For Our Future***

Process Safety Management Standard Audit Protocol

1st Edition

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Foreword

This is a revised version of the first edition of the PSM Standard Audit Protocol. It is almost the same as that originally released, but the question numbering has been corrected in some instances. The only substantive change was the addition of the Operations functional group to the question for sub-element 6G1.

This Audit Protocol for the CSChE Process Safety Management Standard was prepared by the Process Safety Management (PSM) Subject Division of the Canadian Society for Chemical Engineering (CSChE). The PSM Guide, upon which the Standard is based, was developed through the Major Industrial Accidents Council of Canada (MIACC), a voluntary alliance of interested parties dedicated to reducing the frequency and severity of major industrial accidents. From 1987 until its dissolution in 1999, this partnership included the federal, provincial and municipal governments, industry, labour, emergency response groups, public interest groups and academia.

On the dissolution of MIACC, the PSM aspects of this initiative were transferred to the new subject division of the CSChE, which was formed for this purpose.

The material in the PSM Guide is based on the approach developed by the U.S. Center for Chemical Process Safety (CCPS). The CCPS was established in 1985 as a Directorate of the American Institute of Chemical Engineers to focus on engineering practices that will help prevent or mitigate catastrophic process safety incidents.

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Disclaimer

The proposed application of this publication is stated in the Introduction. While the information presented in this document is intended to assist users in the safe design and operation of facilities handling, using, processing or storing hazardous materials, the user is advised that neither the Canadian Society for Chemical Engineering (CSChE) nor persons involved in producing this publication warrant to represent, expressly or implicitly, the correctness or accuracy of the information presented herein. This publication is intended to provide general guidance and not advice for specific situations, nor is it meant to constitute a legal standard of care.

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Introduction

The **Process Safety Management Standard** established by the Canadian Society for Chemical Engineering in 2012 identifies the requirements of a **management system** that will address the scope of issues covered by **Process Safety Management** (PSM) for facilities handling or storing potentially hazardous materials. The overarching purpose of the Standard is to identify the performance requirements that can be audited by an organization or a third party to recognize and address gaps that may exist in the overall management system. The Standard identifies the expected results of the various policies, practices and procedures that will help to ensure the organization achieves the desired results.

The Standard defines the minimum requirements that must be in place to ensure the 12 Elements are adequately addressed. Any deficiencies can lead to unacceptable risks to safety, health and the environment or loss of assets and/or production. An organization would normally include these minimum requirements in an integrated health, safety, environmental and risk management program that will be effective in preventing incidents at facilities that manufacture, store, handle or otherwise use potentially hazardous materials. The Standard also includes Guidelines for some of the elements. While not mandatory, the Guidelines have been included as they represent recommended best practices in helping to meet the Standard.

The questions included in the PSM Audit Protocol have been prepared as a master audit tool that can be used to establish whether an organization is meeting the requirements of the PSM Standard. While many of the audit questions imply yes/no answers, they do require technical knowledge to verify. In addition, some of the questions are of a more qualitative nature. Thus an audit of adherence to the standard needs to be conducted by an individual or team who are knowledgeable in the principles and practice of process safety. For convenience, questions that address the Guidelines have also been included in italics for easy identification.

Each of the questions is followed by one or more letter designations. They indicated the functional groups in the organization that should be responsible for the protocol item and, therefore, should be interviewed for a given audit question. The letter designations for functional groups are:

Contact Legend

E	Engineering
H	Human Resources
I	Inspection/Quality Assurance
L	Leadership
M	Maintenance/Reliability
O	Operations
P	Purchasing/Field Buyer
S	Safety/Risk
T	Training

Master PSM Audit Protocol

	Element 1. Accountability; Objectives and Goals	Contacts
1a	How are Process Safety goals and objectives established throughout the company?	LH
1b	Are PSM goals and objectives visible to and understood by all workers?	LEOMPT
1c	Are there company objectives that demonstrate the priority of Process Safety compared to other business objectives like production and cost?	LEOM
1d	Is accountability for Process Safety clearly identified in roles, responsibilities, and position descriptions?	LEOMPH
1e	Are there appropriate resources available to meet the Process Safety goals and objectives?	LEOMPI
1f	Are there examples of management commitment to Process Safety at all levels of the organization, e.g., directives that state inadvertent loss of process containment situations must be eliminated?	LEOM
1A	Continuity of operations	
1A1	Is there a policy that makes it clear when operations personnel have the authority to shut down a facility if they believe it is unsafe to operate?	LOMTI
1A2	Are there guidelines or procedures to determine when the facility should be shut down or output reduced for planned or unplanned maintenance or modifications?	LOMTI
1A3	How is the need for spare and redundant equipment identified at the design stages of a project so the facility can reduce the need for a complete shutdown?	LEOMP
1A4	How does the company decide when to segregate parts of a facility so that small sections of the facility can be shut down without shutting down the complete operation?	LOEI
1A5	Is there a process in place to decide when there is a need to install multiple lines rather than relying on a single stream operation?	LOEI
1B	Continuity of systems	
1B1	Are resource allocations driven by the process hazards rather than by the economic viability of the process?	LEOM
1B2	Is there a process to allocate adequate resourcing of supporting job functions or units for each phase of the life cycle of the process?	LH
1C	Continuity of organization	
1C1	Are PSM responsibilities clearly defined as part of position or job descriptions?	LEHOMPI S
1C2	During changes in organizational structure is there a process in place to assure that PSM responsibilities are maintained?	LH
1C3	Is accountability for PSM flexible enough to accommodate organizational changes while ensuring that Process Safety tasks are properly assigned and performed throughout the change?	LH
1D	Quality process	
1D1	Do workers understand the scope of issues involved in PSM?	LEOMPI
1D2	Does the facility maintain monitoring programs to track the status of Process Safety?	LEOMI
1D3	Are there established goals, targets and key performance indicators (KPI) for measuring Process Safety performance?	LEOMIH
1D4	Is there guidance in place to address deviation from this performance?	LHMI

1D5	Is there a quality assurance system for all aspects of work that includes checking, verification, validation, documentation and configuration management, as appropriate?	LEOMI
1E	Control of exceptions	
1E1	Is there a process in place to allow exceptions in engineering designs to be managed with appropriate controls by assigning accountability to qualified personnel?	E
1E2	Is there a process in place to assign accountability for construction, commissioning and decommissioning of facilities?	LEIOPS
1E3	Is there a process in place to allow exceptions in operating procedures to be managed with appropriate controls by assigning accountability to qualified personnel?	O
1E4	Is there a process in place to allow exceptions in maintenance practices and procedures to be managed with appropriate controls by assigning accountability to qualified personnel?	MI
1E5	Is there a process in place to allow exceptions in purchasing practices and procedures to be managed with appropriate controls by assigning accountability to qualified personnel?	P
1E6	Is there a process in place to allow exceptions in qualifications of operating personnel to be managed with appropriate controls by assigning accountability to qualified personnel?	OH
1E7	Is there a process in place to deal with situations that are outside the defined elements of existing management systems?	L
1E8	<i>Has the facility identified the minimum operating staff requirements to deal with all foreseeable operating modes, including operational upsets during holidays, and are appropriate controls in place to deal with situations where this minimum operating requirement is not in place?</i>	OH
1F	Alternative methods	
1F1	How are accountability and responsibility assigned when practices and procedures are implemented in compliance with performance standards, which identify only desired results without identifying the methods to be used?	LT
1F2	Where more than one method is available for a given task, e.g. for process hazard reviews, what is the established process ensuring that the method selected is effective in completing the task?	LOT
1G	Management accessibility	
1G1	Is management available to assist in the decision-making process?	LEOMP
1G2	Is leadership available to resolve conflicting views among safety, engineering, maintenance, production and business managers?	LEOM
1G3	<i>Is there a process in place for conflict resolution on issues that include Process Safety?</i>	LEHOMPS
1H	Communications	
1H1	Does senior management communicate their understanding of Process Safety accountability for their unit and individuals within it?	LEOMP
1H2	Are overlapping responsibilities between individuals/units clearly defined and communicated to ensure that no gaps exist?	LEOM
1I	Company expectations	
1I1	How does the Board of Directors and the Executive Management Team communicate their expectations regarded Process Safety performance?	LEOMP
1I2	Are the Process Safety goals consistent with other aspects of the organizational vision or master plan?	LEHOMP
1I3	Are broad Process Safety goals established by management?	LEOMPS

114	Is there a process in place to measure Process Safety performance and take any action that may be required?	LEOMPS
115	Do Process Safety goals address the long-term aims of the company as well as detailed short-term targets?	LEOMP
116	Are adequate resources available within or outside the company to achieve Process Safety goals?	LEOMP
117	<i>Have key leading and lagging indicators been established to measure Process Safety performance (e.g. Process Safety-related incidents should be included as a lagging metric)?</i>	<i>LEOMP</i>
118	<i>Has the organization been benchmarked against others to ensure the best practices are being used?</i>	<i>LEOMP</i>
	Element 2. Process Knowledge and Documentation	
2a	Is information necessary for the safe design, operation and maintenance of the facility written, reliable, current and easily accessible by people who need to use it?	LEOMP
2b	Where does the facility store the documentation to support Process Safety knowledge?	LEOMPS
2A	Chemical and occupational health hazards	
2A1	Are Material Safety Data Sheets (MSDS) available for every chemical used, stored or produced at the site?	LEOMPST
2A2	Is there a process in place to ensure MSDS information remains current?	SP
	Is information on reactivity and chemical and physical properties readily available:	
2A3	for those involved in process development and design, and	E
2A4	for those involved in operation and maintenance of the facility?	OMS
2B	Process definition/design criteria	
	Does the facility have up-to-date and available:	
2B1	process flow diagrams;	EOT
2B2	data on relevant operating envelopes and safe operating limits (e.g. levels, temperatures, pressures, flows, time, cycles and compositions);	EOT
2B3	data for evaluation of the effects, on health, safety and the environment, of operating outside the safe upper and lower limits;	EOTS
2B4	data on process chemistry, including chemistry of side reactions, by-products and contaminants;	EOTS
2B5	specifications on the maximum intended inventory; and	EOTP
2B6	material and energy balances?	E
2C	Process and equipment design	
	Does the facility have up-to-date and available:	
2C1	piping and instrument diagrams (P&IDs);	EOTMI
2C2	data regarding materials of construction and their suitability to handle process material;	EOTIM
2C3	data regarding process control systems, including software integrity;	EOTM
2C4	data regarding ventilation system design;	EOT
2C5	data regarding critical alarms and systems;	EOTM
2C6	data regarding design codes and standards employed;	EI
2C7	electrical area classification drawings; and	EOT
2C8	plot plans?	ES
2D	Protective systems	

	Does the facility have up-to-date and available data regarding:	
2D1	critical interlocks (systems which either prevent or mitigate incidents);	EOTMS
2D2	pressure relief and venting systems;	EOTIMS
2D3	data regarding relief system design and design basis;	EOT
2D4	Fire and gas detection and protection equipment;	EOTMS
2D5	emergency isolation valves; and	EOTMS
2D6	effluent treatment systems?	EOTM
2E	Normal and upset conditions (operating procedures)	
2E1	Are operating procedures in place and readily accessible to workers who work with the process?	OT
2E2	Is there a system for regularly verifying that procedures are accurate and current?	OT
2E3	Is there a system for updating procedures to ensure they reflect current operating practice including changes of process chemistry, technology, equipment, facilities or organization?	OT
	Do operating procedures address steps for each operating phase, including:	
2E4	initial start-up of a new facility;	OT
2E5	normal and temporary operations;	OT
2E6	emergency shutdown, including identification of conditions which require shutdown;	OTS
2E7	normal shutdown; and	OT
2E8	start-up following an emergency or normal shutdown?	OT
2E9	Do operating procedures address steps required to correct or avoid a deviation from operating limits?	OT
2E10	Do operating procedures address safety systems and their functions?	OT
2F	Process risk management decisions	
2F1	Is there a process to facilitate risk management decisions on an ongoing basis?	LEOMST
2F2	Are risk management decisions documented, showing the decisions made and the basis on which they were made.	LES
2G	Company memory (management of information)	
2G1	Is there a process to document knowledge and information gained from plant experience that is likely to be important for the future safety of the facility?	LEMTIS
2G2	Is the knowledge and information sufficiently catalogued and detailed so that it is not overlooked or forgotten as personnel or the organization change?	LEMTI
	Element 3. Capital Project Review and Design Procedures	
3A	Appropriation request procedures	
3A1	Does the approval process for new capital projects ensure that the request has identified risks as well as capital and other resources necessary to manage those risks?	LET
3A2	Does the approval process require Process Safety reviews to be satisfactorily completed at each stage in order for the project to proceed to the next stage?	LES
3B	Hazard reviews	
3B1	Are hazard reviews completed to ensure risks associated with hazardous material and energy have been identified and the risks are acceptable?	LETS
3B2	Are adequate capital and other resources made available to minimize exposure to workers, the public and the environment to the effects of hazardous materials and energy associated with the process?	LES

3B3	Is the scale of the review dependent upon the hazards of the proposed process and the stage of the project?	LES
3B4	Are more intensive review techniques required as additional information becomes available as the design proceeds?	LES
3C	Siting	
	Does the siting of a proposed expansion or new plant consider:	
3C1	buffer zones between the plant and the public;	LE
3C2	worst credible scenarios for release of a toxic chemical, explosion or fire, and effect(s) on exposed groups;	E
3C3	exposure hazard to and from adjacent plants or facilities;	E
3C4	possible exposures due to natural events such as earthquake, flood, tornado, etc.;	E
3C5	the effects of transporting hazardous material feedstocks or products through local communities; and	LE
3C6	location-specific information such as altitude, distance from the sea or ocean, land topography and meteorological conditions, e.g., direction and velocity of prevailing winds?	E
3D	Plot plan	
	Does the plot plan review of a proposed expansion or new plant specifically consider:	
3D1	congestion, e.g. overlapping hazard zones, difficult access, possible confinement of a vapour release;	E
3D2	location of control rooms, offices and other buildings;	E
3D3	the location of storage areas;	E
3D4	the location of loading and unloading areas;	E
3D5	layout of drainage and location of containment areas;	E
3D6	proximity to and hazards from other process areas;	E
3D7	proximity to public receptors beyond the site boundary	E
3D8	insurance requirements;	E
3D9	federal, provincial and local regulations; and	E
3D10	company/industry spacing guidelines?	E
3E	Process design & review procedures	
3E1	Does the design process include a system for review and approval, with appropriate sign off, at each stage of the design process?	ES
	Does the design process include reviews at the following project stages:	
3E2	conceptual design,	ES
3E3	process design,	ES
3E4	detailed engineering design,	ES
3E5	construction and	ES
3E6	commissioning?	ES
3E7	Is the depth of each review dependent upon the complexity and degree of hazard of the process?	ES
3F	Project management procedures and controls	
3F1	Are there controls in place to ensure that fabrication and installation of equipment corresponds to design intentions and specifications?	EPI
3F2	Is a pre-startup safety review completed before new or modified facilities are put into service?	LEOSI
	Does the pre-startup safety review:	

3F3	confirm that construction meets the design specifications;	LEOI
3F4	ensure safety, operating, maintenance, and emergency procedures are in place and adequate;	LEOS
3F5	confirm that all process hazard analyses have been completed and that recommendations have been resolved or implemented prior to start up;	LEO
3F6	confirm that modified facilities meet the management of change requirements;	LEO
3F7	ensure that worker training has been completed; and	LEOT
3F8	ensure critical equipment has been identified and incorporated into a preventive maintenance program?	LEOM
3F9	Are project management controls documented and do they form part of the project file?	E
	Element 4. Process Risk Management	
4A	Hazard identification	
4A1	Does the facility have a practice in place to identify hazards associated with operation and maintenance of the facility?	LEOMST
4A2	Does the facility have access to practitioners that are trained in hazard identification methods such as What If, Checklist, HAZOP, LOPA , Bow-Tie, FMEA, or Fault Tree Analysis?	LEST
4A3	Are hazards that have been identified addressed by emergency response plans?	LS
4A4	<i>Does the facility have access to practitioners that are trained in application of the Dow Fire and Explosion Index and the Dow Chemical Exposure Index to assess the degree of hazard?</i>	<i>LEST</i>
4B	Risk analysis of operations	
4B1	Does the facility have a process to estimate the risks once hazards have been identified?	LES
4B2	<i>Does the facility estimate risk based on the combination of potential consequences and the likelihood of occurrence, using qualitative and/or quantitative methods such as fault tree, event tree or risk indices?</i>	<i>LES</i>
4B3	<i>Does the facility evaluate the total risk by comparison to criteria for acceptability?</i>	<i>LES</i>
4C	Reduction of risk	
4C1	Does the facility have a process to reduce those risks that are deemed unacceptable?	LES
4C2	<i>Does the range of risk reduction methodologies employed by the facility include protective equipment, improved training and procedures as well as Inherently Safe Design principles, such as inventory reduction, alternative processes and alternative materials?</i>	<i>ES</i>
4D	Residual risk management	
4D1	Does the facility have a documented emergency response plan to manage residual risks and mitigate the effects should an incident occur?	LS
4D2	Does the emergency response plan identify an emergency control centre sited in a safe location?	SP
	Does the emergency response plan contain:	
4D3	emergency reporting procedures;	S
4D4	a list of designated assembly areas with alternatives, if needed;	S
4D5	emergency escape routes and evacuation procedures;	S
4D6	procedures to account for people following an evacuation (headcount);	S
4D7	emergency response procedures (fire suppression, spill control, etc.);	SP
4D8	rescue and medical duties;	S
4D9	Organizational duties during an emergency;	SP
4D10	provisions for visitors, contractors and handicapped workers;	S

4D11	information regarding co-ordination with local community fire department and/or other response personnel;	S
4D12	procedures for workers required to operate critical systems;	S
4D13	the requirements for internal and external communications;	SH
4D14	required response equipment and location; and	S
4D15	notification of the affected public?	S
	Does the facility have a site wide alarm system that:	
4D16	has distinctive alarms to indicate; "Alert", "Evacuate" and "All Clear";	S
4D17	has an easily remembered means of activation, e.g. a special telephone number; and	ST
4D18	is regularly tested and maintained?	ST
4D19	Are workers trained in the use of the emergency response plan?	SPT
4D20	Are regular drills carried out to test the effectiveness of the emergency response plan?	SPT
4D21	Are copies of the emergency response plan readily available to all workers?	SPH
4D22	<i>Is there a process to consult with those who may face risks resulting from process operations (e.g. workers, community).</i>	S
4D23	<i>Are critical portions of the emergency response plan posted in conspicuous locations throughout the facility along with a diagram detailing emergency evacuation routes?</i>	S
	<i>Does the emergency response plan:</i>	
4D24	<i>comply with any applicable requirements under Section 200 of the Canadian Environmental Protection Act (CEPA);</i>	S
4D25	<i>contain possible mutual aid arrangements, where necessary; and</i>	S
4D26	<i>include contingency and recovery plans?</i>	ES
4E	Process Management during emergencies	
4E1	Does the facility have written emergency procedures to cover management of both the process where the emergency occurs and also other processes which interact with or are near that process?	OT
4F	Encouraging client and supplier companies to adopt similar risk management practices	
4F1	Does the facility have a process to encourage client and supplier companies to adopt risk management practices that will minimize the risks of incidents at upstream and downstream facilities and while materials are being transported between sites?	LPS
4G	Selection of businesses with acceptable risk	
4G1	Does the company have a process in place to assess and deal with risks for new businesses or future acquisitions?	LP
	Element 5. Management of Change	
5a	Is a written procedure required to manage all changes to the operation of any facility except replacement in kind?	LEOTP
	Does the Management of Change system:	
5b	contain a clear definition of change (scope of application);	LS
5c	require a description and technical basis for the proposed change;	LS
5d	address the potential impacts of the proposed change on health, safety and environment;	LSP
5e	address authorization requirements to make the change;	LS
5f	address training requirements for workers or contractors following the change; and	LS

5g	address updating of documentation including: Process Safety information, operating procedures, maintenance procedures, alarm and interlock settings, and fire protection systems?	LES
5A	Change of Process Technology	
5A1	Are critical operating parameters or safe operating limits readily available to operations personnel?	LEO
5A2	Is proposed operation outside current operating limits subject to prior review and approval by qualified personnel?	LEO
5A3	Does the Management of Change system address the means to contact personnel if authorization of a change in process technology is needed on short notice?	LO
5B	Change of facility	
	Does the Management of Facility Change system:	
5B1	define facility changes that are not replacement in kind;	EM
5B2	address major equipment changes through the Capital Project Review and Design System;	E
5B3	address smaller changes and minor changes, e.g. a cross connection or instrumentation change;	LEM
5B4	require an assessment of hazards and risks associated with the change;	EMIS
5B5	require approval by qualified personnel; and	L
5B6	address contingencies for "emergency" changes?	LS
5C	Organizational changes	
5C1	Does the company have a process in place to assess and deal with risks associated with changes to the organization and the organizational structure?	LH
	Does the Management of Organizational Change system:	
5C2	address the transition period as well as the way the new organization is to work;	LH
5C3	address change in reporting relationships even where no staff losses occur;	LH
5C4	address the need for transfer and retention of knowledge and skills due to departure of staff, and especially elimination of organizational units (e.g. through downsizing);	LH
5C5	ensure accountability and safe control of operations continues despite the loss of key knowledge and skills; and	LH
5C6	ensure the workload consequent to any staff reductions does not result in unacceptable short- or long-term increases in risk?	LH
5D	Variance procedures	
5D1	Is there a process in place to ensure that exceptions to procedures are managed promptly and the situation remains under control?	LO
5D2	Do variance procedures require review and approval by qualified personnel.	LO
5D3	Does the system ensure that all involved understand the basis for the approval and the new limits established for the variance?	LO
5D4	<i>Are variance procedures easy to use?</i>	<i>LO</i>
5E	Permanent changes	
5E1	Does the facility subject permanent changes to the steps of planning, organizing, implementation and control in conjunction with other plant programs such as the systems for work order, purchase order, Capital Project Review and Design, etc.?	LE
5E2	Is risk management a part of the systems for dealing with permanent changes?	LE

5F	Temporary changes	
5F1	Does the facility subject temporary changes to conditions similar to those that apply to permanent changes?	LEMI
	Does the Management of Temporary Change process require:	
5F2	the time limit for the change to be clearly defined;	LOM
5F3	a review and approval if an extension of the time limit is required; and	LOM
5F4	a plan to ensure that all equipment, etc. is returned safely to normal conditions at the end of the change?	LOM
	Element: 6. Process and Equipment integrity	
	Are written procedures used to maintain the ongoing integrity of process equipment including:	
6a	pressure vessels and storage tanks;	MI
6b	pipng, instrument and electrical systems;	MI
6c	process control software;	MI
6d	relief and vent systems and devices;	MI
6e	emergency and fire protection systems;	MI
6f	controls including monitoring devices and sensors, alarms and interlocks;	MI
6g	power transformers, elevating devices, and cranes (including overhead type gantry units);	MI
6h	rotating and hydraulic equipment?	MI
6i	Is documentation maintained in a file for each piece of equipment?	MI
6A	Reliability engineering	
6A1	Has equipment critical for Process Safety been identified?	M
6A2	Are predictive maintenance schedules established for monitoring, inspection and performance testing of equipment critical to Process Safety to enable cost effective correction of problems before they develop to a critical stage?	M
6B	Materials of construction	
6B1	Have systems been established, where appropriate, to supplement industry standards such as piping and pressure vessel codes?	EMI
6B2	Is there a system to identify critical items that may need special tracking to verify materials used are as specified?	EMPI
6C	Fabrication and inspection procedures	
	Does the quality assurance program include a material control system that ensures installed equipment:	
6C1	meets the requirements of the design specification;	MP
6C2	is traceable to its manufacturer;	MP
6C3	has met all required testing, with test results available on site; and	MP
6C4	is labeled to be clearly identifiable to the people doing the installation?	MP
6D	Installation procedures	
6D1	Are critical steps in the installation of equipment identified during the planning phase?	EM
6D2	Is field inspection used to verify that installation corresponds to design?	EM
6E	Preventative maintenance	

	Is there a preventative maintenance (PM) program in place that includes:	
6E1	a method of identifying critical equipment;	MP
6E2	a method to establish PM frequencies for critical equipment;	MP
6E3	a mechanism to ensure that PM is completed at the required frequency; and	M
6E4	a record of the previous items?	M
6F	Process, hardware and systems inspection and testing	
6F1	Is a pre-startup safety review conducted before ‘feed-in’ for a new or modified process?	MI
6F2	Does the pre-startup safety review cover both equipment and operating procedures to assure that all elements are in place and functional?	LEO
	Is inspection and testing of process equipment:	
6F3	according to good engineering practices; and	MI
6F4	at a frequency determined by applicable codes and standards, or more frequently if operating experience suggests this is necessary?	MI
	Does inspection and testing of process equipment incorporate:	
6F5	a system to ensure corrective action is taken when results fall outside acceptable limits,	MI
6F6	documentation that includes:	MI
6F7	• date of inspection;	MI
6F8	• name of inspector;	MI
6F9	• serial number or other equipment identifier;	MI
6F10	• description of the tests done;	MI
6F11	• results of the inspection or test; and	MI
6F12	• recommended actions?	MI
6F13	<i>Is a pre-start-up safety review conducted before starting up replacement equipment or recommissioning mothballed equipment?</i>	<i>EIMO</i>
6F14	<i>Are baseline conditions established for equipment and piping?</i>	<i>MI</i>
6G	Maintenance procedures	
6G1	Does the facility have safe work practices for proper control of maintenance, construction and related activities that apply to both workers and contractors?	OMT
	As a minimum, do the safe work practices cover:	
6G2	permits to work and their application (hot work, confined space entry, lock out/tag out, excavation, master tag, etc.);	OM
6G3	opening of process lines and equipment;	OM
6G4	control of access to the facility by maintenance, contractor, laboratory and other personnel?	O
	Is there a system in place to:	
6G5	ensure maintenance procedures are in place and readily accessible to workers;	M
6G6	regularly verify that procedures are current and accurate; and	M
6G7	update procedures to incorporate changes in maintenance practice?	M
6H	Alarm and instrument management	
6H1	Does the facility have safe work practices for alarm and instrument management that includes equipment hardware as well as computer components and software instructions for process control?	M
	As a minimum, do alarm and instrument management programs cover:	
6H2	identification and prioritization of critical alarms and interlocks;	M
6H3	a procedure to control changes to alarm set points and interlock systems; and	M

6H4	a system of regular testing of interlock systems and pressure safety valves (PSVs)?	M
6I	Decommissioning and demolition procedures	
6I1	Does the facility have procedures in place to address safe removal of equipment from service, dismantling, decontamination and related disposal of waste?	EOMSI
	Element 7. Human Factors	
7a	Is there a process or system to address human factors at the design, construction and operational phases of a project?	E
7A	Operator-process/equipment interface	
7A1	Does the facility assess human interactions with the facility as part of the design process?	EOM
7A2	Is there a process to address computerized control systems that can confront operators with unmanageable amounts of information during an upset condition (alarm management)?	EOM
	Does the process examine the following interfaces for potential problems:	
7A3	alarm display;	EO
7A4	information display; and	EO
7A5	ergonomics?	EO
7A6	Are task analyses used to determine what can go wrong during the task and how the potential problem areas can be controlled?	OST
7A7	<i>Do human factors assessments address confusing equipment, positioning of dials, colour coding, different directions for on/off etc.?</i>	E
7B	Administrative control versus hardware	
7B1	Is there a strategy with respect to the use of administrative versus hardware controls?	E
7B2	<i>When administrative controls are installed in preference to engineering controls, is there a process to review the effectiveness of the administrative controls at a future date to ensure they remain effective?</i>	EO
7C	Human error assessment	
7C1	Does the company address human factors throughout the facility lifecycle including design, construction, commissioning, operation and maintenance?	EOMST
7C2	Does the company have access to individuals trained in human error assessment or does it provide training internally?	EST
	Do human factor reviews consider approaches to reducing human error that include:	
7C3	written guidelines and procedures;	ES
7C4	human factor audits;	ES
7C5	written communications; and	ES
7C6	design of operator - process/equipment interface?	ES
7C7	<i>Does the human factors review include factors such as understanding, judgment, motivation, education, training, stress, fatigue and cognition?</i>	S
	Element 8. Training & Performance	
8a	Does the company have a process in place to ensure workers receive training to provide the skills required to do the job?	LT
8b	Does the training process include ongoing retraining to maintain these skills?	LT

8A	Definition of skills and knowledge	
8A1	Are key jobs identified and their required skills, knowledge and abilities documented?	LTPH
8A2	Is training given to ensure that people doing these jobs are competent?	LTP
8B	Design of operating and maintenance procedures	
8B1	Does the facility have a standard process or procedure for developing the job procedures, including job descriptions and job safety analysis?	LTH
8B2	Does the facility use operating and maintenance procedures as the basis for developing training programs?	LT
8C	Initial qualifications assessment	
8C1	Does the facility specify qualification, testing and evaluation requirements to ensure that prospective workers have the aptitude and base knowledge/skills, which with appropriate training, will enable them to do the job?	LTP
8D	Selection and development of training programs	
8D1	Does the facility require that workers and contractors be trained to understand and use site safety systems?	LTP
	In particular, are the following items covered:	
8D2	general safety rules;	LT
8D3	permit to work procedures;	LT
8D4	use of personal protective equipment;	LT
8D5	emergency procedures;	LT
8D6	specific hazards of the area in which they will be working; and	LT
8D7	specific hazards of the materials which they may encounter?	LT
8D8	Is a competency test administered to workers and contractors to ensure that the information given has been understood?	LTP
8E	Measuring performance and effectiveness	
8E1	Does the facility utilize a method of testing or verification to ensure that the training is understood to a level consistent with doing a job safely?	LT
8F	Instructor program	
8F1	Does the training program identify specific criteria for instructor selection?	LTP
8F2	Does the training program identify specific instructor training to ensure that instructors have sufficient teaching/communications skills as well as the necessary technical knowledge?	LTP
8G	Records management	
8G1	Does the facility maintain a record of training received by each person in each task?	LT
8G2	Do training records include the name of the trainer, the date of the training and the results of the competency verification?	LT
8G3	Are training documents used to track training received and to schedule retraining?	LT
8H	Ongoing performance and refresher training	
8H1	Does the training program include refresher training to ensure skills remain at a level consistent with the safe operation of facilities?	LT

	Element 9. Incident Investigation	
9A	Is there a program in place to investigate incidents, near misses and abnormal events?	LS
9B	Major incidents	
	Does the incident investigation process include:	
9B1	a clear definition of what is meant by major incident;	LS
9B2	investigation of every actual or potential process-related incident;	LS
9B3	procedures for doing an investigation;	LS
9B4	prompt investigation by a competent person having the knowledge, skill and experience to effectively lead and/or conduct the investigation and at least one person knowledgeable in the process where the incident occurred; and	LS
9B5	a report to management following the investigation stating:	LS
9B6	o incident date;	LS
9B7	o incident description;	LS
9B8	o factors which contributed to the incident, and	LS
9B9	o recommendations to prevent recurrence?	LS
9B10	<i>Are people involved in investigations required to receive training, with emphasis on root cause analysis?</i>	LS
9C	Third party participation	
9C1	Does the incident investigation process identify when external participants should be included in the investigation team?	SPT
9D	Follow-up and resolution	
9D1	Does the incident investigation process include a follow-up system to address the recommendations made in the report and ensure timely implementation of corrective actions?	LST
9E	Communication	
9E1	Are key results of investigations shared, as appropriate, with other parts of the plant, and within the organization, the chemical industry and other industries where the lessons learned could usefully be applied?	SH
9F	Incident recording, reporting and analysis	
9F1	Does the company maintain a system of analysis of incident reports to identify opportunities for elimination of commonly recurring or systemic causes?	S
9G	Near-miss reporting	
9G1	Are near-misses and abnormalities recorded, investigated and analyzed as part of the incident investigation process?	S
	Element: 10. Company Standards, Codes and Regulations	
10a	Does the company have a management system to ensure that the various internal and external guidelines, standards and regulations are current, disseminated to appropriate people and departments, and applied throughout the organization?	LES
10A	External codes/regulations	

10A1	Is there a process in place to monitor and respond to changes in applicable legislation and regulatory framework?	LES
	Does the process cover:	
10A2	environmental regulations;	LES
10A3	occupational health and safety regulations;	LES
10A4	planning and zoning regulations;	LES
10A5	boiler and pressure vessel codes;	LEMS
10A6	electrical and building codes; and	LEMS
10A7	fire codes?	LEMS
	Is there a process in place to monitor and respond to changes in external standards including:	
10A8	Industry-wide standards such as those published by the Canadian Standards Association (CSA), the American Petroleum Institute (API), the American Society of Mechanical Engineers (ASME), the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI);	E
10A9	Professional technical bodies such as the Center for Chemical Process Safety (CCPS), the American Institute of Chemical Engineers (AIChE), design groups (e.g. the Design Institute for Emergency Relief Systems), the Canadian Society for Chemical Engineering (CSCHE), and the Chlorine Institute; and	E
10A10	National and international codes, such as those published by the National Fire Protection Association (NFPA), and the International Labour Organization (ILO)?	S
10B	Internal standards	
	Is there a process in place to monitor and respond to changes in internal standards, including:	
10B1	general standards, e.g. maintenance practices (hot work, inspection, etc.);	OM
10B2	reporting procedures (incident reporting, equipment data, etc.);	S
10B3	behaviour in plant areas (smoking, driving, etc.);	S
10B4	specific process standards, e.g. chemistry, process design principles, metallurgy, etc.; and	E
10B5	mechanical, electrical, civil, and instrument design standards?	E
	Element: 11. Audits & Corrective Actions	
11a	Has the company implemented an audit system to determine the status and effectiveness of safety management efforts versus goals and also the progress toward those goals?	ST
11A	PSM system audits	
11A1	Do the management systems audits verify that the systems are effective in assuring company/plant policies and procedures are being implemented?	SPT
11A2	Do the management system audits identify opportunities where systems may be strengthened?	ST
11B	Process Safety audits	
11B1	Does the company have a system to conduct Process Safety audits to provide increased assurance that facilities are being operated and maintained in a way that properly protects the safety and health of workers, the environment, the surrounding community, plant assets and continuity of operations?	S
11C	Compliance reviews	
11C1	Does the company conduct compliance reviews to verify adherence to regulations and to company/plant standards and procedures?	S

11D	Internal/external auditors	
11D1	Are audits conducted by teams of plant personnel and partially staffed with expertise from outside the plant to provide objectivity and fresh ideas?	S
11E	Corrective actions	
11E1	Do facilities develop an action plan with assigned responsibilities to resolve recommendations from an audit?	S
11E2	Do facilities maintain a follow-up system to verify completion and track/report outstanding recommendations from an audit?	S
	Element: 12. Enhancement of Process Safety Knowledge	
12a	Does the company encourage continuous improvement that builds on the experiences and knowledge within the company and incorporates the technological advances that are constantly emerging throughout the industry?	LEMSTI
12b	Does the company utilize the knowledge it gains through incident reports, maintenance records, case histories, and trend analysis of upset conditions to provide basic information and changes that can help prevent catastrophic events?	LMSTI
	Does the company maintain a Process Safety resource system that contains:	
12c	material relevant to the design technology and operation of the process;	EM
12d	incident reports;	S
12e	plant equipment design data;	EM
12f	plant equipment inspection/testing data;	
12g	design practices and specifications;	E
12h	appropriate laws and regulations;	S
12i	trade association information;	E
12j	physical and chemical properties data, including reaction kinetics and safe handling information;	E
12k	technical papers;	E
12l	case histories concerning incidents which illustrate PSM principles;	E
12m	a search facility available locally or through arrangement with another organization, e.g. a large local reference library; and	E
12n	appropriate reference books?	E
12A	Quality control programs and Process Safety	
12A1	Does the company/facility have an integrated approach to PSM that applies the concepts contained in quality management programs (Plan, Do, Check, Act)?	L
12B	Professional and trade association programs	
12B1	Does the company/facility encourage participation in professional and trade associations as a means to enhance Process Safety knowledge?	LE
12C	Technical association programs	
12C1	Does the company/facility encourage participation in technical associations as a means to enhance Process Safety knowledge?	LE
12D	Research, development, documentation and implementation	

12D1	Do research and development programs include Process Safety inputs from departments such as safety, environment, operations, engineering, and maintenance?	LE
12D2	Is data supplied from all research projects documented, available to all who need to know, and communicated to plant operations to assure that new knowledge is incorporated into the enhancement of Process Safety?	LE
12E	Improved predictive systems	
12E1	Is the information contained in incident reports, equipment failures, and maintenance records properly catalogued and analyzed for opportunities for continued improvement in Process Safety?	MSI
12F	Process Safety resource centre and reference library	
12F1	Does the company/facility maintain a reference library?	EP
12F2	Does the company/facility reference library contain a Process Safety section?	EP
	Does the company/facility Process Safety section include:	
12F3	reference books,	EP
12F4	technology-specific references, and	EP
12F5	journals and proceedings of conferences to provide topical interest?	EP
12F6	Are the necessary resources and accountability for the library and contents formally established?	L
12F7	Is there a process to assure the information is kept current and disseminated throughout the plant to those who need to know?	L