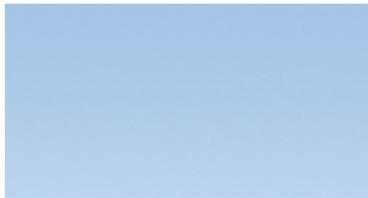
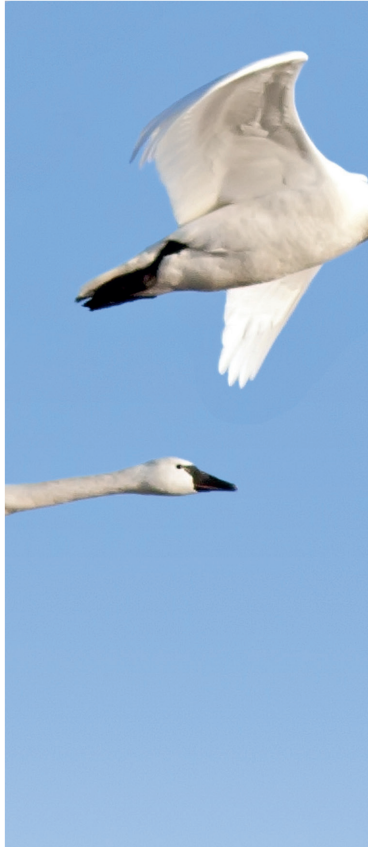
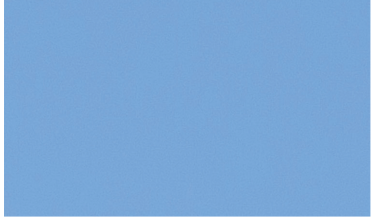


ISC Process Safety Competency Guidance

Supplementary guide – how
to build and develop process
safety competence



released October 2020



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Preface

The IChemE Safety Centre (ISC) is an industry-funded and led organisation, focussed on improving process safety through sharing information and learnings. ISC members can nominate specific areas of focus, and ISC leads the development work in these areas, working with personnel from member companies and process safety competency was identified as an initial area of work for ISC. Once a specific need was defined by the ISC Advisory Board and the project sponsor, the team set about the project. This consisted of reviewing the current guidance material available on this topic. There are several different organisations that have published guidance on how to establish a process safety competency framework. However, these documents stop short of actually defining different levels of competency for different roles – ie, developing the framework in a generic sense. ISC's guidance document takes the step to create the generic framework, for different types of roles in an organisation. The project resulted in the publishing of "*ISC Process Safety Competency Guidance*", initially published in 2015 and further updated and published as Edition 2 in 2018.

This supplementary guide extends the original *ISC Process Safety Competency Guidance* document further, with suggested tasks and development activities that could be undertaken in order to build competence in the relevant topics. This Supplementary Guide should be read in conjunction with the *ISC Process Safety Competency Guidance Edition 2* as it provides a roadmap to how the competencies within that guidance could be achieved.

ISC believes that a functional approach to process safety is important to increase people's understanding of their requirements. Process safety is about managing the integrity of operating systems by applying inherently safer design principles, effective engineering and disciplined operating practices. It deals with the prevention and mitigation of incidents that have the potential for a loss of control of a hazardous material or energy. Such loss of control may lead to severe consequences with fire, explosion and/or toxic effects, and may ultimately result in loss of life, serious injury, extensive property damage, environmental impact and lost production with associated financial and reputational impacts. Effective management of process safety requires leadership across six functional elements in an organisation. These are:

- culture;
- knowledge and competence;
- engineering and design;
- human factors;
- systems and procedures;
- assurance.



These elements can be thought of as a chain of safety, rather than applied to James Reason's Swiss Cheese Model¹. This is because we do not need failures in all elements to have an incident, but rather multiple failures in one element could result in an incident. The integrity of the chain is in the multiple layers behind it, hence demonstrated knowledge and competency in all elements is required across an organisation.

This edition of the document covers all 18 competencies as defined in the *ISC Process Safety Competency Guidance Edition 2, 2018*.

This version of the supplementary guide includes development activities for the following competency topics:

1. Safety leadership commitment, responsibility and workplace culture;
2. Hazard identification and risk assessment;
3. Safety in design;
4. Asset integrity;
5. Project delivery;
6. Management of major emergencies and emergency preparedness;
7. Incident reporting and investigation;
8. Audit, assurance, management review and intervention.

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How to use this guidance

This document provides an example of the tasks and activities that could be undertaken to achieve the relevant level of competence in the range of competency topics defined in *ISC Process Safety Competency Guidance Edition 2*. Each organisation should determine the specific requirements for implementation.

This document can be used to support implementation of a process safety Competency Management System. There is a range of guidance available to assist in developing a Competency Management System (eg *Cogent and UKPIA Guidelines for Competency Management Systems for Downstream and Petroleum Sites*²; *European Process Safety Centre Process Safety Competence, How to set up a Process Safety Competence Management System*³; *Health and Safety Executive, Managing competence for safety-related systems, 2007*⁴).

Recommended steps for using the Development Activities are detailed below:



1. Determination of required competency level for each topic

- a. Refer to *ISC Process Safety Competency Guidance Edition 2* to ascertain the required competency level for a role within your organisation.



2. Alignment with process safety competency criteria

- a. This guide is based on the Competency Criteria defined for different organisational roles within *ISC Process Safety Competency Guidance Edition 2* – if your organisation uses different criteria, then you should consider how it reflects your own organisation's criteria.



3. Alignment with process safety organisation roles

- a. This guide provides general information for developing competence within a range of topics – not all development activities will be relevant for each role.



4. Develop plans to address competency gaps. Competency gaps may be addressed by undertaking the development activities suggested within this guide, which have been structured around three main development areas:

- a. Experience based learning from undertaking tasks
- b. Learning through others from Networking and Exposure
- c. Formal Education, Training and Qualifications



5. Monitor the process safety competency process to determine whether the development activities result in achievement of the target level of competence.



6. Review and update the development activities for each competency topic.

Undertaking Development Activities

The development activities in this guide have been structured around a three part approach to learning and development that is common to the various approaches used by a number of ISC member organisations (eg the 70:20:10 learning model by Lombardo and Eichinger and other similar models).

However, it is not compulsory to use the structure used within this guide in order to identify and undertake the suggested development activities – there are many learning and development models available and the suggested development activities in this guide could be adapted to fit within other models.

While this document refers to a number of IChemE training packages, these are examples only, there may be other similar programmes available to you.

Table 1: Development areas

Learning and Development Area	Typical Development Activities
Learning through experience	Expanding your scope of work Applying learning in real situations Learning through new experiences
Learning through others	Receiving feedback Structured mentoring and coaching (both giving and receiving) Communities (eg industry groups, forums, conferences etc)
Learning through education	Formal training individual training education Professional qualifications and accreditation

Establishing competency

The *Process Safety Competency Supplementary Guide, How to Build and Develop Process Safety Competence*, has been produced to reflect the competency topics defined in *ISC Process Safety Competency Guidance Edition 2*, which contains further information on the competency topics and definitions and should be read in conjunction with this document and attachments.



Competency topics

Eighteen topics were defined *ISC Process Safety Competency Guidance Edition 2* as requiring specific process safety competency and were then mapped against the six ISC functional elements.

Table 2: Competency topics

Element	Topic
Culture	Safety leadership commitment, responsibility and workplace culture
Knowledge and competence	Process safety concepts
	Hazard identification and risk assessment
	Hazard awareness specific to the operation
Engineering and design	Safety in design
	Asset integrity
	Codes and standards
	Management of change
Human factors	Human factors
Systems and procedures	Systems, manuals and drawings
	Process and operational status monitoring and handover
	Contractor and supplier selection and management
	Safe systems of work
	Project delivery
	Management of major emergencies and emergency preparedness
	Incident reporting and investigation
Assurance	Legislation and regulations
	Audit, assurance, management review and intervention

Competency development activities have been included for the following topics, highlighted in bold in the above table.

Additional topics will be released over time.

Competency definitions

Competency is defined across a four-tier scale, based on a combination of the tiers used by some ISC members. This allows for granular determination of the competency required across a varied workforce. The tiers are defined below:



Awareness

Has knowledge of the theory and displays conceptual understanding. Actively participates in discussions regarding the skill. Performs routine tasks with significant supervision. Learns how to do things.



Basic application

Performs fundamental and routine tasks. Requires occasional supervision. Increased functional expertise and ability. Works with others.



Skilled application or proficiency

Independent contributor. Integrates work with other disciplines. Frequently mentors or coaches others. Assesses and compares alternative options.



Mastery or expert

Advanced experience in the particular skill. Applies creative solutions to complex problems. Defines and drives critical business opportunities and needs. Represents the organisation internally and externally on critical issues. Sets standards within the organisation. Recognised as a subject matter expert.

For each topic, the specific requirements at each level of competency were developed. The requirements for each competency level dictate that the requirements for the lower levels are met.

References and further information

1. Reason, J, *Managing the risks of organisation accidents*, Ashgate Publishing Limited, Hampshire, 1997
2. Cogent and UKPIA, *Guidelines for Competency Management Systems for Downstream and Petroleum Sites*, Cogent, UK, 2011
3. European Process Safety Centre, *Process Safety Competence – How to set up a Process Safety Competence Management System*, EPSC, UK, 2013
4. Health and Safety Executive, *Managing competence for safety-related systems*, 2007
5. Kletz, T, *Plant Design for Safety*, CRC Press, 1991
6. The OHS Body of Knowledge, supported and maintained by the Safety Institute of Australia **www.ohsbok.org.au**
This reference contains a chapter on *Process Hazards – Chemical* and a chapter on *Managing Process Safety*

Safety leadership commitment, responsibility and workplace culture

Competency definition	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
	• Aware of the importance of visible safety leadership • Aware of and participates in the company safety programmes • Demonstrates knowledge of workplace safety culture • Engaged and owns safety responsibilities and accountabilities • Reports safety incidents and understands the importance of accurate reporting	• Understands the importance of visible safety leadership • Has the communication skills necessary to hold an effective safety intervention • Participates in safety related conversations and suggests improvements • Initiates safety conversations • Able to communicate: - why safety is important to the individual and the company - what behaviours the individual is expected to consistently adopt • Ensures that their communication and behaviour consistently send a message that safety is embedded as a personal core value • Understands human factors and their relationship to safety performance	• Identifies and clearly articulates behavioural requirements to workforce, contractors and subcontractors • Identifies and publicly recognises individuals who display the desired safety behaviours and attitudes • Identifies at-risk behaviour activators • Sends clear and consistent messages about the importance of process safety • Identifies and implements safety improvements • Holds regular in-field safety conversations with front-line workers • Undertakes regular in-field verification of controls and lessons learned from significant incidents • Ensures that their communication and behaviour consistently send a message that safety is embedded as a core value	<i>Technical elements...</i> • Mastery in designing and implementing safety leadership programmes • Measures and assesses culture • Designs and implements cultural change programmes • Designs and implements improvement plans • Develops culture definitions and norms in an organisation <i>Management elements...</i> • Ensures leadership team is aware and committed to the provision of adequate levels of financial resources, staffing and supervision to ensure an effective safety culture to support safety • Monitors HSE metrics to review effectiveness of the leadership programme (leadership time in-field, levels of supervision, behavioural-based interactions) and the link to adverse events

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition (continued)			- Involves their team and behaves in a manner that builds positive relationships within the workforce - Understands and applies resourcing requirements to manage process safety. - Able to recognise change and manage it effectively	- Exhibits leader behaviours which will increase the likelihood of copied and reciprocated safety behaviours - Communicates the importance of visible leadership in establishing an effective safety culture

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	Attend internal training or undertake work activities to identify the need to report incident and how that information is used to stop future incidents	<i>Awareness plus...</i> - Undertake appropriate safety interventions to control risks - Prepare toolbox talks for presentation to your work group - Engage in safety conversations relating to the task hazards - Participate in incident investigations to identify underlying causes and contributing factors	<i>Basic application plus...</i> - Lead discussions relating to safety culture and behavioural requirements at team meetings and interdisciplinary meetings - Identify opportunities to publicly recognise individuals who have displayed desired safety behaviours - Undertake appropriate in-field safety conversations as part of a behavioural safety programme - Identify process safety controls related to your discipline and undertake appropriate in-field verifications - Identify opportunities to discuss lessons learned from significant incidents - Develop workplans to ensure resources are appropriately applied to manage process safety and implement process safety improvements	<i>Technical elements</i> <i>Skilled plus...</i> - Develop the company standards for Safety Leadership - Develop processes for measuring and assessing safety culture - Identify improvements to safety leadership and culture; develop implementation plans - Prepare reports for senior management on safety culture and improvements required - Monitor and adapt best practice from industry into safety leadership and safety culture programmes <i>Management elements...</i> <i>Skilled plus...</i> - As part of the management team, provide sufficient resources to ensure an effective safety culture - Monitor HSE metrics to review effectiveness of leadership programme and identify improvements - Review and Challenge metrics and reports to ensure accurate reflection of process safety management and culture - Visibly exhibit safety leadership behaviours

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning from others	• Discuss safety programmes, safety culture, etc with peers and mentor/senior employees • Identify safety responsibilities and accountabilities as part of Performance Review process	<i>Awareness plus...</i> • Discuss safety implementation recommendations with peers and team leader • Seek feedback and learn during the execution of safety conversations and interventions • Discuss requirements for behaviours that demonstrate that safety is embedded as a personal core value as part of Performance Review process • Mentor or coach a junior professional to help them understand the importance of visible safety leadership • Review safety culture related recommendations from case studies and incident reports and discuss with peers	<i>Basic application plus...</i> • Mentor and coach team members in desired safety behaviours and positive relationships within the workforce • Discuss the effectiveness of safety behaviours and relevant messages with operational managers • Attend conferences and/or work with industry groups relating and process safety • Discuss requirements for safety verifications as part of Performance review process	<i>Technical elements Skilled plus...</i> • Undertake or review the findings of research in safety culture • Present at conferences or industry meetings on safety leadership and culture programmes within your company for the benefit of others • Maintain connections with professional bodies that develop and maintain standards • Present findings from safety programmes to other subject matter experts within your organisation <i>Management elements... Skilled plus...</i> • Communicate the importance of visible leadership and safety culture at company meetings • Engage with peers internally and externally to discuss the importance of visible leadership in developing an effective safety culture • Mentor others, including senior personnel, in the importance of leadership for process safety

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning from education	- Gain initial exposure through attending company or site inductions - Read Chapter 10 "The Organisation" in OHS Body of Knowledge	<i>Awareness plus...</i> - Organisational training on safety intervention or safety observation programme - IChemE Process Safety Awareness course	<i>Basic application plus...</i> - Frontline Supervisor training - Training in Coaching and Leading others - Management Skills training	<i>Technical elements Skilled plus...</i> - Graduate or postgraduate OHS Qualifications - Human Factors course - Keep abreast of trends and changes in workplace culture - Member of an appropriate professional body. and/or - Continual professional development through an appropriate professional body <i>Management elements... Skilled plus...</i> - IChemE Process Safety Leadership and Culture Programme

Process safety concepts

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	• Aware of process safety concepts, eg 6 pillars • Aware of the similarities and differences between process safety, personal safety, and their hazards	• Understands the concept of process safety • Applies process safety concepts into daily work activities	• Mentors others in process safety • Communicates process safety concepts with target audiences and stakeholders • Identifies learnings from past process safety events	• Process safety subject matter expert • Designs process safety awareness sessions for various levels within company • Communicates process safety issues and programmes with leadership/management team and gains their support • Links learnings from past events to process safety framework

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience	Attend internal training/inductions that describe process safety concepts	<i>Awareness plus...</i> - Observe/participate in a process safety related hazard identification workshop or risk assessment - Review your company standards/processes and applicable documentation for process safety related subjects such as reports of HAZIDS, HAZOPs, Safety Cases, etc - Assist in the preparation of a process safety related hazard identification or risk assessment	<i>Basic application plus...</i> - Develop work plans to include appropriate process safety activities - Utilise role to reinforce importance of process safety - Lead discussions relating to process safety at team meetings and interdisciplinary meetings - Identify process safety controls related to your discipline - Identify opportunities to discuss lessons learned from significant incidents and near misses (internal and external)	<i>Skilled plus...</i> - Develop the company standards for process safety expectations - Develop guidelines for implementing process safety concepts into the organisation - Develop organisation-wide performance measures for process safety - Review process safety performance and lessons learned from events to identify required improvements - Prepare reports for senior management on process safety performance and improvements required - Develop/deliver training in process safety concepts and principles - Review and reference good industry practice - Adapt process safety practices from industry into organisation

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/exposure	- Discuss process safety concepts relevant to your department with your team members and supervisor - Discuss process safety concepts with peers and mentor/senior employees - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Identify process safety responsibilities and accountabilities as part of Performance Review process - Mentor or coach a junior professional to help them understand process safety concepts - Review process safety related recommendations from case studies and incident reports and discuss with peers - Prepare toolbox talks on process safety concepts for presentation to your workgroup - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Mentor junior staff in application of process safety - Coach or train others in the application of process safety principles - Review process safety incident reports and case studies from similar industries and share lessons learned amongst team and wider organisation - Attend conferences and/or work with industry groups relating and process safety	<i>Skilled plus...</i> - Present at conferences or industry meetings on process safety lessons/improvements within your organisation for the benefit of others - Mentor others, including senior personnel, in process safety concepts - Undertake or review the findings of research into new process safety concepts - Maintain connections with professional bodies that are involved with process safety - Present findings from process safety programmes to other subject matter experts within your organisation - Participates in industry forums on process safety - Provide feedback and input to industry guides and standards on process safety

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - Company/site induction - In-house process safety management course - IChemE Online Course – Six Pillars of Process Safety	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/IChemE Safety Centre – Process Safety for the 21st Century - Read books and articles Courses offered by IChemE - An Introduction to Process Safety - Management of Change: The Essentials (online) - Introduction to Risk Assessment - Process Safety Management: Thinking in Outcomes (online) - Process Safety Awareness	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by IChemE: - IChemE Online Course – Safety Case Awareness - IChemE Fundamentals of Process Safety	<i>Skilled plus...</i> - IChemE Register Professional Process Safety Engineer - Chartered member (or equivalent) of an appropriate professional body and/or Continual professional development through an appropriate professional body - Peer-review, co-author articles and books - IChemE Process Safety Leadership and Culture Programme

Hazard identification and risk assessment

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/ proficient	Competency level 4 – mastery/ expert
Competency definition	- Aware of basic hazard identification processes (eg Step Back 5x5, Job Hazard Analysis (JHA), etc) and where they are used - Aware of the terms hazard, cause, consequence, control, risk and as low as reasonably practicable (ALARP) - Aware of the hierarchy of controls, and what impacts a controls effectiveness, eg human factors, design, etc - Aware of safety case major incident scenarios and what controls are safety critical	- Participates in risk assessment processes - Understands the way process safety hazards are controlled, what those controls are and how effective they are - Understands the terms safety case, loss of containment (LOC), hazard identification (HAZID), hazard and operability study (HAZOP) and layers of protection analysis (LOPA) - Identifies control improvements or new controls for risk reduction	- Mentors others in conducting risk assessments - Identifies who needs to be involved in the development of hazard identification processes - Leads risk assessment processes - Applies the pros and cons of each assessment method in selecting the correct method - Able to demonstrate understanding and application of reducing public risk as it applies to process safety - Implements new or improved controls for risk reduction	- Subject matter expert for hazard identification and risk control - Engages with leadership team to provide resources for identification and assessment - Mastery in consequence modelling concepts and details - Develops risk criteria - Develops control strategies – eg from inherently safer design through to emergency response - Develop strategies and guidance documents

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	- Attend internal training/ inductions or undertake work activities that describe processes and applicable documentation (eg safety cases and environment plans) - Observe/participate in a hazard identification workshop or risk assessment - Review your company standards/processes and applicable documentation such as reports of HAZIDs, HAZOPs, JHAs and the safety case	<i>Awareness plus...</i> - Undertake hazard assessment within your work place on a day to day basis - Assist in the preparation of a hazard identification or risk assessment - Actively participate as a team member in a number of hazard identification and risk assessment workshops - Review the risk assessment matrix applicable to the company/site to develop an understanding of how it is applied - Assist in the completion and closeout of risk treatments resulting from risk assessments - Develop an understanding of the hierarchy of controls to be applied to mitigate risk and become familiar with some examples of these controls - Discuss the types of controls with discipline experts within your company and determine how control effectiveness is measured	<i>Basic application plus...</i> - Develop leadership and facilitation skills to confidently manage a workshop team - Prepare and undertake a considerable number of hazard identification and risk assessment activities - Identify opportunities and assess costs/benefits for implementing risk reduction controls	<i>Skilled plus...</i> - Develop ability to have influence on the direction to be set for the application of risk assessment tools - Undertake sufficient risk assessments to be credible in proposing the direction in developing new or better risk assessment processes - Gain experience in different organisations to be credible in participating in industry forums on this subject - Set standards relating to the implementation of Hazard Identification and Risk Assessment tools and techniques - Monitor and adapt best practice from industry into risk criteria - Develop guidelines for implementing appropriate hazard identification and risk assessment techniques and monitor outcomes of risk assessments

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning from others	Discuss the effectiveness of examples of risk assessments and your reasoning with your supervisor/team members	<i>Awareness plus...</i> - Learn during application from workshop leader and other team members - Through discussions with supervisor, team members and the safety team the participant learns the spectrum of hazards to consider and the controls that might be applied	<i>Basic application plus...</i> - Mentor junior staff in application of risk assessment techniques - Discuss the types of risk assessments and their pros and cons with other risk assessment leaders - Discussions with site manager on the effectiveness of safe systems of work employed on the site - Attend conferences	<i>Skilled plus...</i> - Mentor others, including senior personnel, in application of risk assessment techniques and the appropriateness of controls - Maintain connections with technical groups and industry bodies that develop and maintain standards - Present at conferences or industry forums

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through education	- Company/site induction - In-house safety management course	<i>Awareness plus...</i> - Basic risk assessment courses - Associate Member of an appropriate professional body (where applicable) Courses offered by IChemE: - Fundamentals of Process Safety - Hazard Identification Techniques - Hazard study awareness - Introduction to Risk Assessment	<i>Basic application plus...</i> - Higher level leadership courses such as HAZOP Leader course - Chartered Member of an appropriate professional body Or - Continual professional development through an appropriate professional body - Read books and articles Courses offered by IChemE: - Inherent Safety in Design and Operation Development - HAZOP - LOPA	<i>Skilled plus...</i> "Fellow" equivalent of an appropriate professional body - Peer-review, co-author articles and books Courses offered by IChemE: - HAZOP study leadership and management - Expert hazard awareness

Hazard awareness specific to the operation

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/ proficient	Competency level 4 – mastery/ expert
Competency definition	Applies to specific hazards of facility or organisation - Aware of the relevant processes occurring in area of plant/equipment - Aware of the risks associated with the process occurring in the area/equipment	Applies to specific hazards of facility or organisation - Understands the performance indicators that govern the safety of the process - Understands the triggers for action, the importance to act, and what action is required - Lists and implements all operating procedures - Able to describe and apply tools available	Applies to specific hazards of facility or organisation - Able to interpret what performance indicators mean in terms of the safety of the process - Able to make or authorise changes to correct the situation - Able to troubleshoot problems - Able to develop and recommend procedures - Recognises the physical and chemical properties of the materials that are being processed	Applies to specific hazards of facility or organisation - Mastery in describing the process physics and chemistry and how they are controlled and influenced - Mastery in defining the basis of safety for the facility including understanding previous incidents

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience	- Attend internal training/inductions that describe the processes and risks associated with plant/equipment - Review sample reports such as risk assessments, HAZOPs, etc and the Safety Case or Major Hazard Facility Safety Reports	<i>Awareness plus...</i> - Participate in process safety related hazard studies - Assist in the generation of relevant regulatory submissions (eg safety case/major hazard facility safety report) relating to specific process safety hazards - Prepare toolbox talks on specific process safety hazards including performance indicators, triggers and actions for presentation to your workgroup - Review organisation's process safety related performance indicators related to your area - Review procedures relating to process safety hazards and ensure their requirements - Utilise role to reinforce importance of understanding specific process safety hazards - Consider specific process safety hazards when developing Management of Change documentation - Identify opportunities to discuss lessons learned from significant incidents and near misses relating to specific process safety hazards	<i>Basic application plus...</i> - Develop process specifications to include process safety hazards - Monitor and review process safety indicators relating to specific process safety hazards - Monitor and review compliance with procedures relating to process safety hazards - Review internal project delivery standards and processes in relation to physical and chemical properties of process safety hazards - Utilise role to reinforce importance of understanding physical and chemical properties of process safety hazards - Consider specific process safety hazards when developing, reviewing, or approving Management of Change - Seek guidance from peers and SMEs on potential process safety hazards - Use formally established processes to lead and manage hazard assessment	<i>Skilled plus...</i> - Review process safety incidents and near misses to determine how underlying process conditions and chemistry contributed to the incidents (internal and external) - Monitor and adapt best practice from industry to define performance standards for process safety hazards - Develop the organisation's standards for control of specific process safety hazards - Define operational discipline requirements relating to process safety hazards - Develop organisation-wide performance measures for process safety - Develop competency requirements for process physics and chemistry - Monitor process safety metrics relating to process conditions

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/exposure	- Discuss the specific process safety hazards and risks within your organisation with your team members and broader organisation - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Identify responsibilities and accountabilities relating to process safety procedures as part of Performance Review process - Mentor or coach a junior professional to help them understand performance indicators - Review process safety hazard related recommendations from case studies and incident reports and discuss with peers - Prepare toolbox talks on hazard awareness for presentation to your workgroup - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Mentor team members in physical and chemical properties and performance indicators - Review incident reports and case studies relating to specific process safety hazards from similar industries and share lessons learned amongst team and wider organisation - Discuss the importance of understanding physical and chemical properties when conducting detailed risk assessments relating to specific process safety hazards - Discuss the importance of understanding physical and chemical properties with operational managers	<i>Skilled plus...</i> - Present at conferences or industry meetings on the physics and chemistry of specific process safety hazards within your organisation for the benefit of others - Review lessons learned from incidents relating to specific process safety hazards and incorporate into your organisation's processes - Mentor others, including senior personnel, in physics and chemistry of process safety hazards - Maintain connections with professional bodies that are involved with process safety - Provide feedback and input to industry guides and standards on specific process safety hazards

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/ qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - Read and understand Process Hazards (Chemical) section in OHS Body of Knowledge - Organisation/site induction covering specific process safety hazards	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/ICHEM Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Read books and articles Courses offered by IChemE: - Chemical Engineering for Scientists - Chemical Engineering for Other Engineers - An Introduction to Process Safety - Introduction to Risk Assessment - Process Safety Management: Thinking in Outcomes (online) - ICHEM Process Safety Awareness course	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by IChemE: - ICHEM Fundamentals of Process Safety - Process Safety Performance Indicators and PSM Auditing - Advanced Hazard Assessment Techniques - Expert Hazard Awareness - Industry/hazard related technical training: eg - Comprehensive Explosion Science - Explosion Risk Management - Chemical Reaction Engineering	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body - ICHEM Process Safety Leadership and Culture Programme

Safety in design

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/ proficient	Competency level 4 – mastery/ expert
Competency definition	- Aware of the following process safety related concepts for Safety in Design: - Inherently safer design (ISD) - Risk-based design - ALARP principle - Aware that there are legislative and regulatory requirements (eg safety case or equivalent report); codes and standards relating to safe process/facility design, construction and operation	- Applies under supervision the relevant legislative and regulatory requirements, codes and standards relating to safety in design - Provides basic technical input to design requirements as applicable to their industry to meet safety in design objectives - Applies a basic knowledge of the following process safety related concepts for Safety in Design: - ISD - Risk-based design - ALARP principle	- Provides comprehensive technical input to design as applicable to their industry to meet safety in design objectives including incorporation of all applicable legislation/regulatory requirements, codes and standards - Applies ISD principles - Provides design solutions that incorporate risk-based design and ALARP principle - Liaises with other disciplines (eg instrumentation, mechanical, etc) as to integrate safety in design solutions - Identifies Safety Critical Elements (SCE) and develops Performance Standards	- Leads, evaluates and delivers technical safety requirements as applicable to their industry - Develops applicable corporate process safety design standards, guidelines and philosophies - Possesses detailed knowledge of applicable legislation, regulations, codes and standards - Manages external 3rd Party Service providers supplying specialist, complex process safety services (eg detailed explosion studies)

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	- Attend internal training or undertake work activities to identify applicable laws, regulations; codes and standards - Review the design safety features of your operating area (or project) to see how these have been practically applied to a live example - Review the basic principles of a goal based and prescriptive regime, safety management systems and the principle of ALARP	<i>Awareness plus...</i> - Keep up to date with all laws, regulations and codes that impact design safety within your industry and work area - Incorporate applicable laws, regulations and codes into design, construction or commissioning documentation - Monitor compliance with relevant obligations through the design lifecycle - Provide input as a junior-level participant (eg scribe or support engineer to a senior) in design safety reviews ie HAZID, HAZOP, LOPA as deemed applicable to their industry - Assist in the generation of relevant process safety risk assessments - Assist in the generation of relevant regulatory submissions (eg safety case/major hazard facility report)	<i>Basic application plus...</i> - Perform the role of a design or technical safety engineer on a major project or within an operations/commissioning team. *See list below for discipline specific activities which you may include - Monitor compliance with the application of safety in design principles, goals and key requirements throughout asset lifecycle. Provide recommendations for improvement - Review internal standards and processes and provide recommendations for improvements - Designs simple systems in the absence of laws, codes and regulations - Undertake an ALARP assessment that incorporates multiple disciplines and trade-offs	<i>Skilled plus...</i> - Lead a team of design safety professionals to deliver a project or major change - Demonstrate leadership through communication and actions in design safety within a major project or your company - Develop innovative solutions to design safety problems that go beyond compliance obligations - Set governance standards relating to the incorporation of ISD principles and design safety requirements into assets - Monitor and adapt best practice from industry into company design safety principles, goals and key requirements - Facilitate multiple design safety reviews (eg HAZOP, LOPA, SIL)

* Evaluate different options against ISD principles, develop shutdown/control logic for simple facilities, design/apply cost effective instrumentation and controls safety systems, apply SIL methodology to control measures to inform criticality and criteria, design depressuring systems that account for failure modes and effects, participate in various design safety reviews (eg HAZOP, LOPA, SIL), conduct simple dispersion analysis to provide input for detailed dispersion modelling, assist with fire and explosion analysis to determine consequence of pool and jet fires and potential to escalate, develop fire protection requirements for simple facilities, develop designs for evacuation of facilities, author and review formal safety assessments (eg fire and explosion assessment) and safety case/report, or mitigate likelihoods via mechanical integrity through materials selection, maintenance and inspection practices, operational practices including corrosion inhibition, and instrumentation (LOPA) and shutdown/depressuring systems.

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/ proficient	Competency level 4 – mastery/ expert
Development activities: Learning from others	- Discuss the process safety in design for your organisational area (or project) with your team members and broader organisation - Review and reflect on internal procedures and standards to reflect changes to laws, regulations and codes - Discuss the application of specific obligations reviewed with a mentor/senior engineer	<i>Awareness plus...</i> Mentor or coach a junior professional to help them understand regulatory requirements and their application	<i>Basic application plus...</i> - Attend industry meetings and act on output of meetings to engage with peers outside of your company to support consistent application of safety in design principles - Attend process safety conferences focussed on safety in design - Share safety in design principles and lessons widely within your organisation - Coach or train others in the application of safety in design principles, goals and key requirements - Mentor or coach a junior professional to understand how 'safety in design' impacts their work area - Assist junior professionals to work within the safety design features of their work area	<i>Skilled plus...</i> - Maintain connections with industry bodies that develop and maintain standards. Provide feedback and input to standard amendments to maintain currency - Present at a conference or industry meeting on design safety lessons/improvements within your company for the benefit of others

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: education/Learning through education	- Undertake basic training in Process safety - Graduate engineer or scientist	<i>Awareness plus...</i> Courses offered by IChemE: - Fundamentals of Process Safety - Hazard Identification Techniques - Hazard Study Awareness - Introduction to Risk Assessment - Read Trevor Kletz book: Plant Design for Safety⁵	<i>Basic application plus...</i> - Associate member of professional body including experience undertaking design safety activities in a design/technical safety role Courses offered by IChemE: - Inherent Safety in Design and Operation Development - Consequence Modelling Techniques - Area Classification - Gas Explosion Hazards on LNG Facilities - Gas Explosion Hazards on Offshore and Onshore Facilities - HAZOP - LOPA - Managing the Hazards of Flare Systems - Pressure Relief: protecting equipment and personnel from overpressure - SIL determination and hazard assessment/SIL determination and IEC 61508/61511	<i>Skilled plus...</i> - Chartered member of an appropriate professional body including extensive experience undertaking design safety activities or in a design/technical safety role Courses offered by IChemE: - HAZOP study leadership and management - Comprehensive explosion science - Expert hazard awareness

Asset integrity

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	• Aware that SCE require inspection and maintenance to ensure integrity • Aware of which SCE form critical controls • Supports condition monitoring regimes • Aware of safety critical tasks and the likely effects should these not be carried out	• Able to track and report performance criteria and identify when SCE are not meeting criteria • Understands/can explain reliability, availability and maintainability (RAM) study metrics • Monitors reliability of SCE	• Reviews maintenance and inspection results and trends • Develops protocols for in-field performance measurement • Conducts periodic performance reviews of SCE • Promotes asset integrity • Identifies potential failure modes of critical elements • Assesses failure effects and determines criticality	• Identifies risks to asset integrity • Defines maintenance and inspection regime • Defines specific maintenance and inspection procedures and specifications • Authorises life extensions or changes to inspection programmes • Determines performance standards of SCE • Conducts formal review of SCE and Asset Integrity processes

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	- Read and understand the definition of SCE - Learn which equipment or activities are safety critical and why - Read a safety case and seek to understand the contribution of SCE to prevent major hazard events from occurring; understand the potential consequences of their failure - Read and understand performance standards for a few SCE - Know what assurance activities (including inspections, maintenance, safety critical tasks, etc) are associated with SCE and the Key Performance Indicators (KPIs) that reflect their health	- As a team member, carry out verification testing, reviews or audits against pass/fail criteria based on performance standards for SCE - As a team member, inspect SCE and analyse inspection findings to determine whether SCE meet their performance standards - Apply or utilise the results of reliability, availability and maintainability (RAM) studies for SCE - Gain a clear understanding of the regulations and codes pertaining to SCE, within own industry, and operating country	- Review and trend the results of inspection and maintenance tasks to determine recommendations for improvement - Contribute to identification of SCE, their potential failure modes and criticality in a variety of hazard and risk studies - Contribute to the development of SCE performance standards - Review SCE performance to determine compliance with safety management system requirements - Write technical specifications and assurance and verification activities for SCE	- Demonstrate leadership through communication and actions in asset integrity within a major project or your company - Set internal standard for definition and management of SCE - Develop multiple performance standards for SCE - Set internal standard for asset integrity including maintenance and inspections regime - Monitor and adapt best practice from industry into company asset integrity standards - Review outcomes of authorised deviations from maintenance and inspection routines to determine potential risks to asset integrity - Analyse root causes or underlying issues leading to SCE failure and recommend solutions to problems identified - Develop KPIs for process safety with emphasis on SCE reflecting both leading and lagging metrics - Lead performance management system audits with emphasis on SCE and prepare debriefs for senior management on SCE performance and improvements required

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/ proficient	Competency level 4 – mastery/ expert
Development activities: Learning from others	- Attend process safety related Hazard Studies such as HAZID, HAZOP, LOPA, Risk Assessments, Bowtie Workshops - Observe or find opportunities to support testing, inspection or monitoring of SCE - During site visits, seek to discuss SCE maintenance with site personnel	<i>Awareness plus...</i> - Participate in process safety related hazard studies - Discuss performance of SCE with relevant discipline experts to identify weaknesses, trends and improvement opportunities - Support junior team members in understanding the foundations associated with asset integrity and SCE - Identify and join relevant online discussion forums, newsletters and company posting information relevant to SCE	<i>Basic application plus...</i> - Attend industry forums and provides feedback on SCE performance and improvement opportunities - Coach or train others in the application of asset integrity - Prepare and deliver internal presentations on a relevant asset integrity topic - Share lessons learnt from SCE performance with senior management responsible for operational risk	<i>Skilled plus...</i> - Maintain connections with industry bodies that develop and maintain standards. Provide feedback and input to standard amendments to maintain currency - Present at conferences or Industry and Vendor forums on performance of SCE and methods of detecting weaknesses through KPIs and other metrics - Present general findings from asset integrity programmes to other subject matter experts within your organisation - Establish and/or actively contribute to professional communities within organisation and industry - Guide and support operational personnel in asset integrity activities

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through education	- Undertake basic training in Process safety - Graduate engineer or scientist - Attend courses in Hazard Analysis techniques (eg HAZOP, LOPA, FMEA etc.)	<i>Awareness plus...</i> - Attend advanced courses specific to area of practice in understanding failure modes, eg damage mechanisms, fitness for service, advanced process control, TUV certification, etc Courses offered by IChemE: - Fundamentals of Process Safety	<i>Basic application plus...</i> Associate member of an appropriate professional body <i>Note: A large part of this is self-learning via own work or research. This education/training may not be formally available</i>	<i>Skilled plus...</i> Chartered member of an appropriate professional body <i>Note: there is limited opportunity for further development by formal education at this competency level, which would instead be expected to deliver education</i>

Codes and standards

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	Aware that standards, company/industry reference documents and their business unit equivalents exist	Understands how to assimilate relevant company/industry reference documents into work efforts	- Proficient with company/industry reference documents affecting process safety across multiple disciplines as appropriate - Implements systems to ensure compliance to codes and standards - Uses industry reference documents and engineering tools to develop process/facility design	- Company and/or industry leader in one or more aspects of design - Interfaces with outside contractors in use of, and deviations to, the company standards - Leverages knowledge and acts as a contributing member of industry bodies, especially in developing industry reference documents that fulfil company's needs

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	Review your organisation's register of codes and standards relevant to process safety operations in your area	<i>Awareness plus...</i> - Ensure you are referring to the relevant organisation and industry codes and standards when participating in process safety related hazard studies - Ensure you know how to access the relevant codes and standards through your organisation's systems or industry bodies - Ensure you know who the Company Technical Authority personnel are	<i>Basic application plus...</i> - Inform your team of the need to review and update risks assessments, safety cases' etc related to changes to codes and standards - Monitor activities in your team/area of responsibility to ensure the relevant codes and standards are being used - Develop multi-disciplinary systems and processes to ensure design, construction, operation, and maintenance activities are undertaken using the appropriate codes and standards - Ensure consistency in the application of your organisation's standards - Manage resolution when there are conflicts between codes and standards used	<i>Skilled plus...</i> - Maintain your organisation's register of codes and standards and communicate changes - Co-ordinate the regular review and update of risks assessments, safety cases' etc related to changes to codes and standards in your area of responsibility - Communicate changes to codes and standards to other SMEs in your organisation to ensure consistency into your organisation's standards - Review industry lessons learned from incidents and assess the impact on compliance with your organisation's codes and standards - Prepare reports for senior management on changes to codes standards and impacts on your organisation - Monitor the use of appropriate codes and standards by external stakeholders undertaking work for your organisation - Facilitate and approve risk assessment when deviating from codes or standards, including internal standards and industry good practices

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/ proficient	Competency level 4 – mastery/ expert
Development activities: Networking/ exposure	- Discuss key process safety related codes and standards with your team - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Identify your accountabilities for complying with relevant codes and standards as part of Performance Review process - Discuss relevant codes and standards with senior team members - Research and develop organisation- specific guides and tools for incorporating codes and standards into work activities and share with your team - Prepare toolbox talks on codes and standards for presentation to your workgroup - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Attend process safety conferences relating to codes and standards - Mentor junior staff in application of codes and standards in your area of responsibility - Maintain connections with professional bodies that are involved in developing codes and standards	<i>Skilled plus...</i> - Attend industry and technical briefings and meetings on behalf of your organisation regarding upcoming changes to codes and standards - Contribute to the development of codes and standards relevant to your area of responsibility - Provide feedback and input to industry guides and standards on process safety related aspects - Co-ordinate your organisation's communication and interaction with industry bodies

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/ qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - Read and understand Work Health and Safety Law section in OHS Body of Knowledge - Organisation/site induction covering relevant regulations	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/IChemE Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Read books & articles Courses offered by IChemE: - An Introduction to Process Safety - IChemE Process Safety Awareness - Chemical Engineering for Other Engineers - Chemical Engineering for Scientists - Read Codes and Practices developed by industry bodies	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by IChemE: - IChemE Fundamentals of Process Safety - Inherent Safety in Design and Operation Development - Process Design Practices for Design, Optimisation and Troubleshooting - Preparing Engineering Specifications	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body - IChemE Process Safety Leadership and Culture Programme

Management of change

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	- Aware of the need to manage change - Aware of what is covered by management of change procedure: policies, procedures, work methods, personnel etc - Able to recognise what a change is and initiate the process	- Understands own role in change management - Contributes to implementation of change management - Able to initiate change management process - Prepares management of change (MOC) documents - Understands the change and is able to update information systems eg drawings, manual, procedures etc	- Recognises theory of implementing change and how changes will affect risk - Communicates changes as required - Actively implements change management procedures - Authorises change in their area/competency or is a reviewer on the change	- Subject matter expert across relevant cross-functional areas including hazard identification and risk control, human factors, systems etc - Develops change management process - Actively involved in organisational changes and how they are managed
Development activities: Experience	- Review your organisation's standards/processes and applicable documentation relating to Management of Change - Attend internal training or undertake work activities to identify the need for Management of Change and how that is used to stop future incidents - Review sample Management of Change documentation within your organisation	<i>Awareness plus...</i> - Observe/participate in a Management of Change related or risk assessments - Assist in the preparation of a Management of Change documentation - Monitor compliance with Management of Change requirements in your area - Assist in the completing and closeout of actions resulting from Management of Change reviews - Review the close out of Management of Change within your area	<i>Basic application plus...</i> - Utilise role to reinforce importance of Management of Change - Lead discussions relating to Management of Change at team meetings and interdisciplinary meetings - Identify opportunities to discuss lessons learned from significant incidents and near misses relating to Management of Change - Develop project plans to include required Management of Change processes	<i>Skilled plus...</i> - Maintain your organisation's register of codes and standards and communicate changes - Co-ordinate the regular review and update of risks assessments, safety cases' etc related to changes to codes and standards in your area of responsibility - Communicate changes to codes and standards to other SMEs in your organisation to ensure consistency into your organisation's standards - Develop the organisation's standards for Management of Change

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience (continued)		<i>Awareness plus...</i> • Discuss with SMEs how Management of Change affects other disciplines and determine how change can be managed • Learn from senior team members during implementation of Management of Change • Review different techniques for assessing risk during Management of Change activities (refer competency: Hazard Identification and Risk Assessment)	<i>Basic application plus...</i> • Monitor compliance with the application of Management of Change requirements within your department/area • Review internal project processes in relation to Management of Change and provide recommendations for improvements • Participate in Management of Change risk assessments • Ensure team members are aware of Management of Change requirements • Ensure team members are aware of the application of Management of Change to organisational change as well as hardware change • Review Management of Change documentation and authorise where within your area of responsibility • Seek guidance from peers and SMEs on potential risks relating to complex changes • Ensure Management of Change documentation is reviewed and closed out as required	<i>Skilled plus...</i> • Develop guidelines for implementing Management of Change into the organisation • Develop organisation-wide performance measures for process safety • Review performance of Management of Change processes to identify required improvements • Prepare reports for senior management on Management of Change and improvements required • Develop training requirements for Management of Change for the organisation • Adapt Management of Change practices from industry into organisation • As part of the management team, consistently apply the organisation's Management of Change processes when dealing with organisational change and organisation-wide changes • Monitor HSE metrics to review effectiveness of Management of Change processes

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/exposure	- Discuss Management of Change concepts relevant to your department with your team members and supervisor - Discuss Management of Change for your project with your team members and broader organisation - Discuss the effectiveness of examples of Management of Change and your reasoning with your supervisor/team members - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Identify Management of Change responsibilities and accountabilities as part of Performance Review process - Mentor or coach a junior professional to help them understand Management of Change concepts - Review Management of Change related recommendations from case studies and incident reports and discuss with peers (internal and external) - Prepare toolbox talks on Management of Change for presentation to your workgroup - Engage in safety conversations relating to Management of Change - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Mentor team members in application of Management of Change - Coach or train others in the application of Management of Change principles - Review incident reports and case studies relating to Management of Change from similar industries and share lessons learned amongst team and wider organisation - Attend conferences and/or work with industry groups relating to Management of Change - Discuss the importance of risk assessments in relation to Management of Change - Discussions with site manager on the effectiveness of Management of Change at site - Discuss the effectiveness of Management of Change with operational managers	<i>Skilled plus...</i> - Present at conferences or industry meetings on Management of Change within your organisation for the benefit of others - Review lessons learned from Management of Change incidents and incorporate into your organisation's processes - Mentor others, including senior personnel, in Management of Change requirements - Maintain connections with professional bodies that are involved with process safety - Present findings from Management of Change programmes to other subject matter experts within your organisation - Provide feedback and input to industry guides and standards on Management of Change - Communicate the importance of Management of Change at your organisation's meetings

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/ qualifications	- Undertake basic training in Process safety - Read and understand Management of Change section in OHS Body of Knowledge - Organisation/site induction covering Management of Change - IChemE Online Course – Six Pillars of Process Safety	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/IChemE Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Read books and articles Courses offered by IChemE: - An Introduction to Process Safety - Management of Change: The Essentials (online) - Introduction to Risk Assessment - Process Safety Management: Thinking in Outcomes (online) - Process Safety Awareness	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by IChemE: - Inherent Safety in Design and Operation Development - IChemE Fundamentals of Process Safety - Human Factors in Health and Safety	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body and/or - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body - IChemE Process Safety Leadership and Culture Programme

Human factors

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	- Aware of what human factors are - Aware of how human factors influence human and safety performance - Manages self (fatigue, fit-for-work, at-risk behaviours)	- Manages self (fatigue, fit-for-work, at-risk behaviours) and monitors others - Identifies and responds to observed at-risk behaviours in self and others - Provides feedback on poor job and equipment design and suggests improvements	- Recognises that human factors are concerned with task requirements and its characteristics, the individual's competence and workplace culture and the link to safety - Intervenes when at-risk behaviours are observed - Provides input into job design taking into account human factors - Communicates human factors to the wider workplace - Seeks to solve poor job and equipment design and welcomes suggested improvements - Recognises the impact of contractors on the workforce with respect to safety	- Comprehends how human factors links to process safety - Ensures plant and equipment designs and tasks are designed to take account of both human limitations and strengths - Communicates how an individual's competence, skills, personality, attitude, and risk perception affect safety - Promotes how work patterns, the workplace culture, resources, communications, leadership etc have a significant influence on individual and group behaviour
Development activities: Experience	- Monitor and manage personal compliance with relevant human factors obligations - Attend internal training or undertake work activities to identify how understanding human factors is used to stop future incidents	<i>Awareness plus...</i> - Comply with your organisation's behavioural safety requirements (such as safe observations) and implement corrections if required - Monitor compliance within your team with relevant human factors obligations	<i>Basic application plus...</i> - Develop leadership and project management skills to manage interfaces between individuals, workplace factors and systems - Develop plans to include human factors studies at appropriate stages in project development	<i>Skilled plus...</i> - Lead the human factors aspects of a project or major change - Develop the company standards for Human Factors - Identify process safety improvements to human behaviours, leadership, and culture, and develop implementation plans
	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience (continued)	Review your organisation's regulatory compliance register relevant to process safety operations in your area	<i>Awareness plus...</i> - Participates in workplace and job task reviews and takes personal actions if required - Read your organisation's regulatory submissions (eg safety case/major hazard facility report) to understand how human factors can influence process safety hazards - Understand how to identify and implement human factor improvements via the hierarchy of controls	<i>Basic application plus...</i> - Review human factors related information to and develop guidance for incorporating human factors characteristics into work activities in your area of responsibility - Follow an accepted organisational or industry approach to human factors, recognising the different domains of human factors - Monitor compliance with the application of human factors approaches into your area of responsibility, including human performance, ergonomics, and human/machine interface - Monitor performance of human factors interventions and activities - Review internal project delivery standards and processes to ensure human factors aspects are considered - Ensure human factors aspects are appropriate applied to all workplaces including contractors - Participate in human factors studies that incorporates multiple disciplines - Undertake workplace and job task reviews and implement corrections if required	<i>Skilled plus...</i> - Review industry material, research, and studies to communicate how human factors affects process safety outcomes - Monitor and adapt best practice from industry into process safety related human factors programmes - Set standards relating to the incorporation of human factors into project delivery - Develop guidelines for implementing process safety related human factors studies into projects and changes - Develop project performance criteria for incorporating human factors into process safety requirements

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/ exposure	- Discuss how human factors influence human and process safety performance with your team members - Discuss the application of personal human factors obligations with a mentor/senior engineer - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Mentor or coach a junior professional to help them understand process safety human factors requirements during work activities - Identify your responsibilities and accountabilities for complying with human factors requirements as part of Performance Review process - Prepare toolbox talks on human factors for presentation to your workgroup - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Coach or train others in the application of human factors principles - Review incident reports and case studies relating to human factors from similar industries and share lessons learned amongst your team (internal and external) - Attend conferences and/or work with industry groups relating to human factors in process safety - Discussions with site manager on the effectiveness of human factors and behavioural safety systems at site	<i>Skilled plus...</i> - Present at conferences or industry meetings on how human factors taken into account within your organisation - Review lessons learned from incidents and incorporate human factors related recommendations into your organisation's processes - Mentor others, including senior personnel, in human factors requirements - Maintain connections with professional bodies that are involved with process safety related human factors research - Provide feedback and input to industry guides and standards on human factors in process safety

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/ qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - Read and understand "The Human" section in OHS Body of Knowledge - Organisation/site induction covering fatigue, fitness for work, at-risk behaviours, etc - IChemE Online Course – Six Pillars of Process Safety	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/IChemE Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Read books and articles Courses offered by IChemE: - An Introduction to Process Safety - Process Safety Awareness	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by IChemE: - IChemE Fundamentals of Process Safety - Human Factors in Health and Safety - Incident Investigation, Human Failure & Cause Tree Analysis	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body and/or - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body - IChemE Process Safety Leadership and Culture Programme

Systems, manuals, and drawings

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	- Aware of how to interpret piping and instrumentation diagrams (P&ID), cause and effect charts and process flow diagrams - Aware of how to interpret operations and equipment manuals - Aware of how to locate appropriate documents	- Understand how the document control system works and how to make suggestions for improvement - Understands how to use process safety information in emergency situations	- Contributes to the development and review of P&ID, cause and effect charts, process flows, manuals, and other operational documentation - Uses Management of Change for communicating document changes - Able to use process safety information to explain actual process performance issues	- Defines what process safety documentation is required - Defines authorisation process - Defines document management system and its use in training

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience	- Review your organisation's operations manuals relating to process safety in your area of responsibility - Review your organisation's documentation structure relating to process safety and HSE Management Systems - Review sample reports such as risk assessments, etc that relate to process safety and your organisation's regulatory submissions (such as Safety Cases)	<i>Awareness plus...</i> - Contribute to the update of process safety documentation to ensure they can be utilised during normal operations, process upset or emergency situations - Contribute to process safety related emergency drills - Identify errors or omissions in process safety documentation and report through your organisation's document control system - Contribute to document control processes - Contribute to quality of documents by reviewing against industry standards and guidance	<i>Basic application plus...</i> - Develop guidelines for use of Management of Change in relation to process safety documentation changes - Contribute to the development of process safety documentation - Review lessons learned from incidents and determine impacts to process safety documentation in your area of responsibility - Review process safety documentation and identify errors and omissions - Review control of documents to ensure only controlled copies exist - Contribute to multi-disciplinary process safety activities and interfaces	<i>Skilled plus...</i> - Set governance standards relating to process safety documentation - Develop requirements for process safety documentation for your organisation - Develop guidelines for use of process safety documentation - Review process safety incidents and near misses to determine requirements for process safety documentation - Monitor and adapt best practice from industry to define requirements for process safety documentation within your organisation - Review your organisation's process safety performance standards to define documentation management requirements for process safety information - Define and monitor organisation-wide performance measures for process safety documentation - Lead assurance activities on process safety documentation to ensure compliance

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/exposure	- Discuss process safety for your area of responsibility with your team members and broader organisation - Develop simple guide to process safety documentation and document management systems for presentation at team meetings - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Mentor or coach a junior professional to help them understand process safety documentation - Discuss process safety documentation with senior project team members - Prepare toolbox talks on systems, manual and drawings for presentation to your workgroup - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Review process safety incident reports from similar industries and share lessons learned amongst teams - Coach or train staff in importance of up to date process safety documentation - Review incident reports and case studies relating to process issues from similar industries and share lessons learned amongst team and wider organisation - Participate in quality reviews for changes to process safety information	<i>Skilled plus...</i> - Mentor others, including senior personnel, in the importance of up to date process safety documentation and efficient document management system - Review lessons learned from external incidents to determine recommendations for improved process safety documentation - Maintain connections with professional bodies that are involved with document management

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/ qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - ICChemE Online Course – Six Pillars of Process Safety	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/ICChemE Safety Centre – Process Safety for the 21st Century - Internal training on your organisation's document management system - Read books and articles Courses offered by ICChemE: - An Introduction to Process Safety - ICChemE Process Safety Awareness - Chemical Engineering for Other Engineers - Chemical Engineering for Scientists	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by ICChemE: - ICChemE Fundamentals of Process Safety - Inherent Safety in Design and Operation Development - Chemical Plant Commissioning - Problem Solving and Troubleshooting in Process Operations	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body Courses offered by ICChemE: - ICChemE Process Safety Leadership and Culture Programme - Process Design Practices for Design, Optimisation and Troubleshooting - Process Safety Performance Indicators and PSM Auditing - Human Factors in Health and Safety

Process & operational status monitoring & handover

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	- Aware that safe operating envelopes exist - Aware of the process and what can go wrong - Aware of what is required to keep the process under control - Aware of what to do in an abnormal/emergency situation - Aware that controls have performance criteria and they need to be monitored	- Utilises P&ID, cause and effect charts, process flow diagrams, and operations manuals to troubleshoot minor issues - Able to safely operate the facility within the safe operating envelope - Able to maintain a shift log - Able to track and report control performance criteria	- Recognises how to recover from an abnormal situation and manages start-ups and shutdowns - Able to conduct effective shift handover - Able to interpret weak signals, eg shift log details - Able to mentor new operators	- Understands and alters operating parameters using change management - Monitors and or manages simultaneous operations - Develops operations training materials and framework for competency - Engages senior management in the development and review of process indicators
Development activities: Experience	- Review your organisation's operating philosophy to determine safe operating envelopes for key operations - Review your organisation's processes for planned and unplanned shutdowns - Review sample reports such as risk assessments, HAZOPs, etc and the Safety Case - Review your organisation's operational handover process to ensure all requirements are met	<i>Awareness plus...</i> Ensure that alarm management principles are followed	<i>Basic application plus...</i> - Develop leadership skills to manage interfaces between teams and team members - Contribute to the development of procedures and practices relating to start-ups and shutdowns - Review lessons learned from incidents relating to abnormal operations and start-ups (internal and external) - Look for operational trends and discuss the implications with supervisors, peers, and SMEs on potential process safety hazards	<i>Skilled plus...</i> - Set governance standards relating to the incorporation of process safety into operations - Define your organisation's capacity and competency requirements for operations - Develop requirements for operational training for your organisation - Develop guidelines for use of Management of Change in relation to operating parameters - Review process safety incidents and near misses relating to process operating conditions, handover, process control, etc

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience (continued)		<i>Awareness plus...</i> • Ensure that alarm management principles are followed	<i>Basic application plus...</i> • Utilise role to reinforce importance of process safety principles during abnormal operations • Participate in risk assessments relating to planned and unplanned shutdowns and start-up • Monitor and review compliance with procedures relating to process safety hazards • Develop coaching and mentoring plans for new personnel • Lead dynamic operational risk assessment activities based on real time data and long-term signals or trends	<i>Skilled plus...</i> • Monitor and adapt best practice from industry to define requirements for simultaneous operations within your organisation • Establish monitoring programs and audits to review how your organisation manages simultaneous operations • Define operational discipline requirements relating to process safety hazards • Develop organisation-wide performance measures for process safety • Monitor process safety metrics relating to process conditions • Develop organisation-wide alarm management principles • Develop facility and organisation-wide emergency response requirements

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/ exposure	- Discuss process safety for your area of responsibility with your team members and broader organisation - Discuss the application of specific obligations reviewed with a mentor/senior engineer - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Identify operations responsibilities and accountabilities relating to process safety as part of Performance Review process - Mentor or coach a junior professional to help them understand process safety principles - Discuss process safety requirements with senior project team members - Prepare toolbox talks on process and operational status monitoring and handover for presentation to your workgroup - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Coach or train staff in application of process safety principles - Review process safety incident reports from similar industries and share lessons learned amongst teams - Review incident reports and case studies relating to operational upsets and unplanned shutdowns from similar industries and share lessons learned amongst team and wider organisation - Discuss the importance of shift handovers, shift logs and trending of operational data with operating teams	<i>Skilled plus...</i> - Mentor others, including senior personnel, in the integration of operational discipline and performance standards into process safety indicators - Review lessons learned from Management of Change incidents relating to operational change and incorporate into your organisation's processes - Maintain connections with professional bodies that are involved with operational discipline and process safety

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - Organisation/site induction - Site Emergency Evacuation plans and drills - ICChemE Online Course – Six Pillars of Process Safety	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/ICChemE Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Read books and articles Courses offered by ICChemE: - An Introduction to Process Safety - Introduction to Risk Assessment - Process Safety Management: Thinking in Outcomes (online) - ICChemE Process Safety Awareness course - Industry/operations related technical training - Safe Start-ups and Shutdowns for Process Units - Chemical Engineering for Other Engineers - Chemical Engineering for Scientists	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by ICChemE: - ICChemE Fundamentals of Process Safety - Inherent Safety in Design and Operation Development - Chemical Plant Commissioning - Problem Solving and Troubleshooting in Process Operations - Practical Aspects of Process Control and Instrumentation	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body Courses offered by ICChemE: - ICChemE Process Safety Leadership and Culture Programme - Process Design Practices for Design, Optimisation and Troubleshooting - Process Safety Performance Indicators and PSM Auditing - Human Factors in Health and Safety

Contractor and supplier selection and management

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	- Aware of the process of contractor selection and management - Aware of why specific types of contractors are engaged eg technical experts	- Contributes to the contractor performance evaluation and onsite supervision - Able to provide basic supervision to contractors	- Develops work scope information required to undertake and review work (scope of work, contract requirements, legislative requirements, competency of contractors) - Makes evidence-based decisions regarding process safety competency of company and suitability for project	- Establishes contractor and supplier selection processes/criteria in terms of process safety performance criteria - Establishes system/criteria for evaluating contractor competencies (technical, safety attitude, relevant experience etc)

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience	Review your organisation's standards/processes and applicable documentation relating to contractor and supplier selection and management	<i>Awareness plus...</i> - Observe/participate in a contractor and supplier evaluations and performance reviews - Assist in the preparation of a contractor and supplier selection criteria - Ensure that contractors and suppliers working in your area or responsibility have a clear supervision line - Review performance of contractors and suppliers and implement improvement actions if required - Identify key contractors in your area of responsibility and determine the basis for their technical competence in terms of process safety - Identify and apply appropriate risk management processes for different levels of contractors or suppliers - Identify and apply company procurement requirements	<i>Basic application plus...</i> - Identify opportunities to discuss lessons learned from significant incidents and near misses relating to contractor and supplier selection and management - Develop guidance to include required contractor and supplier selection and management processes as part of work plans - Monitor compliance of contractors and suppliers within your area of responsibility - Seek guidance from peers and SMEs on evidence-based criteria for selection of contractor and supplier - Participate in reviews of contractors and suppliers using your organisation's contractor and supplier selection and performance criteria and apply knowledge to future contracts - Participate in industry contractor qualification processes	<i>Skilled plus...</i> - Develop the organisation's standards for contractor and supplier selection and management - Develop guidelines for implementing contractor and supplier selection and management into the organisation - Develop organisation-wide performance measures for contractors and suppliers including evaluation and performance criteria - Review performance of contractor and supplier selection and management processes to identify required improvements - Develop competency and capability requirements for contractors and suppliers - Adapt contractor and supplier selection and management practices from industry into organisation - Review standards by professional contractor accreditation programs

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/ exposure	- Discuss the evaluation processes for contractors and suppliers your team members - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Identify your accountabilities for supervision of contractors and suppliers as part of Performance Review process - Mentor or coach a junior professional to help them understand contractor and supplier selection and management concepts - Prepare toolbox talks on contractor and supplier selection and management for presentation to your workgroup - Engage in safety conversations relating to contractor and supplier selection and management - Identify supervision responsibilities for contractors and suppliers with your team - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Mentor team members in application of contractor and supplier selection and management processes - Attend conferences and/or work with industry groups relating to contractor and supplier selection and management - Discuss the importance of contractor and supplier evaluation processes being based on required competence relating to process safety - Discussions with site manager on the effectiveness of contractor and supplier selection and management at site	<i>Skilled plus...</i> - Present at conferences or industry meetings on contractor and supplier selection and management within your organisation for the benefit of others - Review lessons learned from incidents and, where appropriate, incorporate into your contractor and supplier selection and management processes (internal and external) - Present findings from contractor and supplier selection and management programmes to other subject matter experts within your organisation - Communicate the importance of contractor and supplier selection and management at your organisation's meetings

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - IChemE Online Course – Six Pillars of Process Safety	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/IChemE Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Contractor Management section in OHS Body of Knowledge - Read books and articles Courses offered by IChemE: - An Introduction to Process Safety - Process Safety Awareness	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by IChemE: - What Engineers Need to Know about Contracts - Engineering Project Management - IChemE Fundamentals of Process Safety	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body and/or Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body - IChemE Process Safety Leadership and Culture Programme

Safe Systems of Work

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	Aware of the safe systems of work tools – Permit to Work, isolations, safe work method statements	Implements safe systems of work including Permit to Work, isolation procedures and safe work method statements into everyday work activities	Facilitates the development of safe systems of work	Identifies where safe systems of work need to be developed

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience	- Review your organisation's requirements for safe systems of work - Review sample reports such as risk assessments, etc that relate to safe systems of work and regulatory submissions (such as Safety Cases) - Undertake all work within the organisation's permit to work system as required	<i>Awareness plus...</i> - Contribute to the update of safe systems of work to ensure they reflect safe operations - Ensure that deviations from safe systems of work requirements are reported as process safety near misses - Develop work procedures in accordance with safe systems of work - Learn from implementing safe systems of work in various operational situations	<i>Basic application plus...</i> - Utilise role to reinforce importance of having formal safe systems of work for process safety critical activities - Monitor compliance with safe systems of work within your area of responsibility - Participate in safe systems of work risk assessments - Establish working groups with appropriate expertise to develop safe systems of work - Seek guidance from peers and SMEs on potential risks relating safe systems of work - Develop training requirements for safe systems of work - Review safe systems of work on a scheduled basis and provide recommendations to improve systems	<i>Skilled plus...</i> - Develop the organisation's standards for identified Safe Systems of Work (experience in utilising systems is useful to support this activity) - Develop guidelines for implementation of identified Safe Systems of Work - Develop organisation-wide performance measures for identified Safe Systems of Work - Review performance of identified Safe Systems of Work processes to identify required improvements

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/exposure	- Discuss safe systems of work with your team members and broader organisation - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Present principles of various safe systems of work at toolbox and team meetings - Identify responsibilities and accountabilities for safe systems of work as part of Performance Review process - Mentor or coach a junior professional to help them understand safe systems of work. - Review safe systems of work-related recommendations from case studies and incident reports and discuss with peers - Undertake behavioural observations on safe systems of work within your area of responsibility - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Attend process safety conferences - Review process safety incident reports from similar industries and share lessons learned amongst project delivery teams - Coach or train staff in application of safe system of work principles. - Review incident reports and case studies relating to from similar industries and share lessons learned amongst team and wider organisation	<i>Skilled plus...</i> - Present at process safety related conferences or industry meetings on implementation of safe systems of work within your organisation for the benefit of others - Review lessons learned from incidents related to failure of safe systems of work and incorporate into your organisation's processes. - Maintain connections with professional bodies that are involved with process safety - Communicate the importance of effective implementation of safe systems of work at your organisation's meetings

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/ qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - Organisation/site induction relating to safe systems of work (eg Permit to Work, isolations, safe work method statements) - IChemE Online Course – Six Pillars of Process Safety	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/IChemE Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Industry/operations related technical training - Safe Systems of work specific training (relating to safe systems of work (eg Permit to Work, isolations, etc) - Read books and articles Courses offered by IChemE: - An Introduction to Process Safety - IChemE Process Safety Awareness course - Control of Work	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body Courses offered by IChemE: - IChemE Fundamentals of Process Safety - Human Factors in Health and Safety	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body. Courses offered by IChemE: - IChemE Process Safety Leadership and Culture Programme

Project delivery

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	Aware of own deliverables and role in achieving process safety outcomes on projects	- Understands the project performance criteria and how they relate to process safety - Understands process safety stages of the project eg risk assessments, siting studies etc	- Manages process safety related interfaces between projects, operations, vendors, designers, etc - Recognises when to apply relevant risk management processes - Reviews project performance against process safety criteria - Project lifecycle reviews incorporating process safety	- Defines project management process and how it aligns with process safety needs - Able to identify and engage subject matter experts when required for process safety aspects

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	- Review the process safety features of your project to see how these have been practically applied to a live example - Review the basic principles of a goal based and prescriptive regime and the principle of ALARP	<i>Awareness plus...</i> - Monitor compliance with relevant obligations through the project lifecycle - Participate in process safety related hazard studies - Assist in the completing and closeout of actions resulting from project safety studies - Assist in the generation of relevant regulatory submissions (eg safety case/major hazard facility report)	<i>Basic application plus...</i> - Develop leadership and project management skills to manage interfaces between project teams and stakeholders - Develop project delivery plans to include process safety studies at appropriate stages - Follow an internal or industry approach to project delivery incorporating process safety requirements - Monitor compliance with the application of process safety principles, goals and key requirements throughout project lifecycle. Provide recommendations for improvement - Review internal project delivery standards and processes in relation to process safety and provide recommendations for improvements - Utilise role to reinforce importance of process safety studies during project delivery - Participate in an ALARP assessment that incorporates multiple disciplines and trade-offs	<i>Skilled plus...</i> - Lead a project team of interdisciplinary professionals to deliver a project or major change - Set governance standards relating to the incorporation of process safety into project delivery - Develop guidelines for implementing process safety studies into project delivery - Develop project performance criteria incorporating process safety requirements - Monitor and adapt best practice from industry into company project delivery principles, goals and key requirements

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning from others	- Discuss process safety for your project with your team members and broader organisation - Discuss the application of specific obligations reviewed with a mentor/senior engineer	<i>Awareness plus...</i> - Mentor or coach a junior professional to help them understand process safety requirements during each project stage - Discuss process safety requirements with senior project team members	<i>Basic application plus...</i> - Attend process safety conferences focussed on projects - Mentor junior staff in application of process safety into project delivery. - Coach or train others in the application of process safety principles within projects - Review process safety incident reports from similar industries and share lessons learned amongst project delivery teams	<i>Skilled plus...</i> - Present at conferences or industry meetings on process safety lessons/improvements within your projects for the benefit of others - Mentor others, including senior personnel, in the integration of process safety studies into project delivery - Present lessons learned from project delivery to other subject matter experts within your organisation

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through education	• Basic Project Management Training • Undertake basic training in Process safety • Process Safety section in OHS Body of Knowledge	<i>Awareness plus...</i> • IChemE Fundamentals of Process Safety and/or Hazard Study Awareness course • Read Trevor Kletz book: Process design for safety (or similar) • Project Management Training	<i>Basic application plus...</i> • Associate member (or equivalent) of professional body • Industry Accredited Project Management Training (or equivalent)	<i>Skilled plus...</i> • Chartered member (or equivalent) of an appropriate professional body • Continual professional development through an appropriate professional body

Management of major emergencies and emergency preparedness

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	• Aware of escape routes, muster points and emergency evacuation procedures • Aware of own role in an emergency • Aware of major incident scenarios • Aware of how to initiate emergency response	• Able to fulfil a role in emergency response as nominated • Understands how to escalate emergency alarm, eg calling emergency services/response	• Ensures team members are aware of emergency response plan and their individual roles and that of the emergency response team • Able to decide on response actions and direct people • Able to plan and undertake emergency exercises	• Develop emergency response plan based on major incident scenarios and results of consequence modelling • Able to monitor effectiveness of response activities • Engage with external emergency services and third parties

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	- Attend internal training or undertake work activities to identify the need to report incident and how that information is used to stop future incidents - Attend internal training/inductions or undertake work activities that describe processes and applicable documentation (eg Safety Cases and Environment Plans) - Attend Site inductions describing major incident scenarios and emergency evacuation procedures - Attend emergency exercises and drills	<i>Awareness plus...</i> - Assist in the preparation stage of an emergency exercises - Participate as a team member in an emergency exercise - Assist in the completing and closeout of actions resulting from emergency exercises - Discuss results and recommendations of emergency exercises with discipline experts within your company or site	<i>Basic application plus...</i> - Develop plans for execution of emergency exercises - Identify appropriate team structure for emergency response - Follow an internal or industry structured approach to emergency response - Lead Emergency Response Teams in emergency exercises and emergencies - Develop leadership skills to confidently manage a team and provide appropriate direction to others - Review emergency response processes and provide recommendations for improvements	<i>Skilled plus...</i> - Set Internal Standards for Emergency Management - Monitor effectiveness of emergency response activities and suggest improvements - Assist in investigations into major incidents to identify improvements to emergency management processes - Develop/deliver training in emergency management and emergency response - Prepare reports for senior management on findings and underlying causes from emergency exercises - Review consequence modelling and major incident scenarios for the operation - Maintain regular engagement with external emergency management stakeholders

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning from others	Discuss the effectiveness of emergency exercises and the process involved with your supervisor/team members	<i>Awareness plus...</i> - Learn during application from emergency response and other team members - Mentor or coach a junior professional to help them understand requirements of emergency response - Join internal and external online professional communities related to process safety	<i>Basic application plus...</i> - Mentor junior staff in emergency response plans and roles - Mentor or coach other personnel in the application of emergency response plans and individual roles - Review recommendations from emergency exercises and incident report data to improve future response - Share case studies and lessons learned relating to emergency response and exercises within your organisation and industry - Attend conferences relating to emergency management relating to your industry	<i>Skilled plus...</i> - Mentor others, including senior personnel, in Emergency Management - Participates in industry forums on this subject - Maintain connections with industry bodies that develop and maintain standards - Provide feedback and input to standard amendments to maintain currency - Present at a conference or industry meeting on findings from within your company for the benefit of others

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through education	- Gain initial exposure through attending company or site inductions - Aware of incident investigation processes and its purpose - Process Safety section in OHS Body of Knowledge	<i>Awareness plus...</i> - Industry accredited emergency response course - Undertake internal emergency response training	<i>Basic application plus...</i> - Associate member of professional body - Qualified Emergency Response Team Leader (Internal or External)	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body - Maintain and extend competency through appropriate Continuing Professional Development (CPD)

Incident reporting and investigation

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	• Aware of the incident reporting requirements and knows how to report an incident • Aware of why incidents are investigated • Aware of media policies and procedures (for major or prominent incidents) • Understands what a process safety incident is	• Contributes to the incident investigation process • Understands importance of preservation of site and evidence	• Plans investigation of incident • Leads basic investigation • Analyses and uses root cause analysis to improve systems performance • Identifies potential consequences of incidents	• Leads major incident investigations • Demonstrates consistent and visible leadership in supporting the reporting and investigation of incidents • Analyses incident statistics to predict trends • Ensures learning from incident investigations across the organisation/project/site • Determines investigation methodologies used

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	- Attend internal training or undertake work activities to identify the need to report incident and how that information is used to stop future incidents - Review your company standards/processes and a sample incident investigation report	<i>Awareness plus...</i> - Contribute to an investigation by providing relevant information and testimony - Assist in the preparation stage of an investigation including preservation of site and evidence - Participate as a team member in an incident investigation - Assist in the completing and closeout of actions resulting from investigations - Discuss results and recommendations of investigations with discipline experts within your company or site	<i>Basic application plus...</i> - Assist lead investigator in a considerable number of investigations to progress to a lead investigator role - Develop plans for execution of investigations - Identify appropriate team structure for undertaking investigations - Follow an internal or industry structured approach to investigations - Utilise structured root cause analysis approaches during investigations - Author investigation reports including clear recommendations based on root cause analysis - Review investigation reports developed by peers - Review internal investigation processes and provide recommendations for improvements	<i>Skilled plus...</i> - Set Internal Standards for undertaking investigations - Develop internal incident reporting and investigation techniques - Monitor effectiveness of investigation process and suggest improvements - Analyse underlying causes to develop a multilayer solution to the problem - Lead major investigations, applying a structured methodology throughout - Develop/deliver training in structured approaches for investigations - Prepare reports for senior management on findings and underlying causes from investigations

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning from others	Discuss an incident investigation report and the process involved with your supervisor/team members	<i>Awareness plus...</i> - Learn during application from investigation leader and other team members - Mentor or coach a junior professional to help them understand requirements of incident reporting and investigation - Join internal and external online professional communities related to process safety	<i>Basic application plus...</i> - Mentor junior staff in application of investigation techniques - Discussions with lead incident investigator - Review investigation reports and incident report data to determine incident consequence classification - Share case studies and lessons learned relating to incident investigations within your organisation and industry	<i>Skilled plus...</i> - Mentor others, including senior personnel, in application of investigation techniques - Participates in industry forums on this subject - Maintain connections with industry bodies that develop and maintain standards - Provide feedback and input to standard amendments to maintain currency - Present at a conference or industry meeting on incident investigation improvements within your company for the benefit of others - Present general findings from investigations to other subject matter experts within your organisation

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through education	- Introduced through initial job training material such as Induction - Aware of incident investigation processes and its purpose - Process Safety section in OHS Body of Knowledge⁶	<i>Awareness plus...</i> - Industry accredited incident investigation course - Undertake internal incident management training	<i>Basic application plus...</i> - Associate member of professional body - Industry accredited or internal Lead Investigator or - Qualified Lead Investigator	<i>Skilled plus...</i> - Chartered member of an appropriate professional body - Professional qualifications in HSE related subject - Maintain and extend competency through appropriate Continuing Professional Development (CPD)

Legislation and regulations

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	Aware that there are laws, codes, and regulations pertaining to safe process/facility design, construction, and operation	- Able to access relevant legislation, regulations, and standards - Able to comply with relevant legislation, regulations, and standards in work activities	- Mentors others in implementing the relevant legislation, regulations, and standards - Informs relevant personnel of the impact of changes to legislation and regulations	- Provides feedback to regulators as required - Interprets legislation in expert field - Liaises with regulators and industry bodies - Recognises when new legislation/codes necessitate updated risk assessments, plant design, operations, etc

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Experience	- Review and understand your organisation's regulatory compliance register relevant to process safety operations in your area - Read your organisation's regulatory submissions (eg safety case / major hazard facility report)	<i>Awareness plus...</i> - Ensure you are referring to the relevant legislation and standards when participating in process safety related hazard studies - Assist in the generation of relevant regulatory submissions (eg safety case/major hazard facility report) - Ensure you know how to access the relevant legislation, regulations, and standards through your organisations systems or from regulator or industry bodies - Ensure you are complying with all relevant legislation and standards	<i>Basic application plus...</i> - Monitor changes to organisation's regulatory compliance register and review impacts on your team /area of responsibility - Inform your team of the need to review and update risk assessments, safety cases' etc related to regulatory change - Monitor activities in your team/area of responsibility to ensure the relevant regulation and standards are being used - Review site documentation against regulations to ensure compliance	<i>Skilled plus...</i> - Maintain your organisation's regulatory compliance register and review at regular intervals and communicate changes - Co-ordinate the regular review and update of risk assessments, safety cases' etc related to regulatory change - Co-ordinate your organisation's communication and interaction with regulatory and industry bodies - Communicate changes to legislation/standards to your organisation's SMEs to ensure changes are incorporated into your organisation's standards and practices - Prepare reports for senior management on changes to legislation/standards and impacts on your organisation

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Networking/ exposure	- Discuss key process safety related legislation and standards - Discuss within your team, how your organisation's regulatory submissions (eg safety case/major hazard facility report) apply to your area of responsibility - Attend and participate in toolbox and team meetings	<i>Awareness plus...</i> - Identify your accountabilities for complying with relevant legislation and standards as part of Performance Review process - Discuss relevant legislation and standards with senior team members - Prepare toolbox talks legislation and regulations for presentation to your workgroup - Subscribe to relevant mailing lists	<i>Basic application plus...</i> - Attend process safety conferences focussed on regulations and standards - Attend process safety conferences where relevant regulators are panel members or keynote speakers - Mentor junior staff in application of legislation and standards in your area of responsibility - Review industry lessons learned from regulatory breaches and assess the impact on your organisation's compliance	<i>Skilled plus...</i> - Present at conferences or industry meetings on how your organisation is responding to changes to legislation and standards - Mentor others, including senior personnel, in the regulatory requirements affecting your organisation - Attend regulator briefings and meetings on behalf of your organisation regarding upcoming legislation changes - Provide feedback and input to industry guides and standards on process safety related aspects - Participate in liaison and advocacy activities with regulators and/or industry associations

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Education/ qualifications	- Undertake basic training in Process safety - Read and understand Process Safety section in OHS Body of Knowledge - Read and understand Work Health and Safety Law section in OHS Body of Knowledge - Organisation/site induction covering relevant regulations - Internal or external legislative awareness training	<i>Awareness plus...</i> - Mary Kay O'Connor Process Safety Center/IChemE Safety Centre – Process Safety for the 21st Century - Basic risk assessment courses - Read books & articles Courses offered by IChemE - An Introduction to Process Safety - IChemE Process Safety Awareness - An Introduction to Process Safety and the Safety Case	<i>Basic application plus...</i> - Associate member (or equivalent) of professional body - Continual professional development through an appropriate professional body - Read guidance developed by regulators and industry bodies Courses offered by IChemE: - IChemE Fundamentals of Process Safety - Preparing Engineering Specifications	<i>Skilled plus...</i> - Chartered member (or equivalent) of an appropriate professional body - Continual professional development through an appropriate professional body - Peer-review, co-author articles and books "Fellow" equivalent of an appropriate professional body - IChemE Process Safety Leadership and Culture Programme

Audit, assurance, management review and intervention

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Competency definition	• Aware there is an assurance process and be able to describe assurance activities relevant to their area • Observes or contributes to assurance activities where required	<i>Awareness plus...</i> • Understand why there are assurance processes • Participates in executing assurance activities and audits under supervision	<i>Basic application plus...</i> • Undertakes lead role in assurance activities such as audits and management reviews • Participates in the establishment of assurance plans	<i>Skilled plus...</i> • Plan assurance strategies on the basis of risk • Analyses assurance findings to develop organisation-wide responses to emerging trends • Drives process safety governance through the governance framework and assurance activities • Guides the organisation in effective implementation of continuous improvement initiatives

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience	Review your company standards/processes and applicable documentation relating to internal assurances processes	<i>Awareness plus...</i> - Contribute to the preparation stage of assurance activities - Develop draft terms of reference for assurance activities - Participate in assessment of performance during local assurance activities - Actively participate as a team member in a number of audits - Assist in the completing and closeout of actions resulting from audit findings - Discuss assurance with discipline experts to gain an appreciation of the scope and context of assurance activities within your company's or site's safety	<i>Basic application plus...</i> - Work with a recognised expert to develop plans for execution of assurance activities - Define when assurance activities should be performed within the relevant project lifecycle - Get involved as an understudy or assistant to the team leader in a significant number of assurance activities to the extent that you can lead them - Understand the importance of the critical stages in assurance processes - Review internal standards and processes relating to assurance and provide recommendations for improvements - Author and review assurance reports and documents	<i>Skilled plus...</i> - Develop the company standards for audit and assurance activities - Develop the assurance plans for the organisation - Undertake sufficient assurance activities to be credible in proposing the direction in developing new or better processes - Consistently apply structured methodologies when executing or leading assurance activities - Identify improvements to assurance processes based on experience and credibility - Develop and monitor company KPIs for audit and assurance - Analyse underlying trends in assurance findings to develop organisation-wide improvements - Prepare reports for senior management on performance audit and assurance processes and improvements required

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through experience (continued)			• Monitor compliance with the application of principles, goals and key requirements relating to assurance activities • Identify non-compliances from audit requirements in a justifiable manner and compose succinct findings • Utilise role to reinforce importance of undertaking audits and assurance activities to the required standard	• Develop processes for management to review findings and recommendations from audit and assurance processes and to identify intervention and/or continuous improvement • Monitor and adapt best practice from industry into process safety governance framework • Develop new and more effective processes or techniques relating to assurance activities

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning from others	Review and discuss the effectiveness assurance reports and processes with your supervisor/team members	<i>Awareness plus...</i> - Seek feedback and learn during the execution of assurance activities from leader and other team members - Mentor or coach a junior professional to help them understand requirements of assurance processes and their application - Join internal and external online professional communities related to process safety and assurance in particular	<i>Basic application plus...</i> - Mentor assurance team members in application of assurance processes - Discuss the effectiveness of assurance activities with operational managers - Mentor or coach other personnel in the application of principles, goals and key requirements of audit and assurance - Share case studies and lessons learned relating to assurance activities within your organisation and industry - Attend conferences relating to assurance and process safety - Discuss issues and findings with other assurance leads - Take an active involvement in online professional communities that are relevant to your organisation's assurance activities	<i>Skilled plus...</i> - Mentor others, including senior personnel, in application of appropriate audit and assurance techniques - Participate in industry forums on assurance and process safety governance - Maintain connections with industry bodies that develop and maintain standards - Present at conferences or industry meetings on aspects of assurance activities - Present general findings from assurance programmes to other subject matter experts within your organisation - Establish and/or actively contribute to professional communities within organisation and industry - Guide and support operational personnel in implementation assurance activities

	Competency level 1 – awareness	Competency level 2 – basic application	Competency level 3 – skilled application/proficient	Competency level 4 – mastery/expert
Development activities: Learning through education	- Gain initial exposure through attending company or site inductions that describe audit and assurance processes - Undertake initial on the job training for internal assurance processes - Process Safety section in OHS Body of Knowledge⁶	<i>Awareness plus...</i> - Undertake Industry accredited or internal introduction auditor training - Review reports, findings and recommendations from internal assurance activities and audits	<i>Basic application plus...</i> - Industry accredited or internal Lead Auditor training or - Qualified Lead Auditor	<i>Skilled plus...</i> - This level of competence would be involved more in imparting education <i>Skilled plus...</i> - Maintain and extend competency through appropriate Continuing Professional Development (CPD) "Fellow" equivalent of an appropriate professional body

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and serving society

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