IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE

ISC Process Safety Competency Guidance

Edition 2, 2018

Supplementary guide – how to build and develop process safety competence

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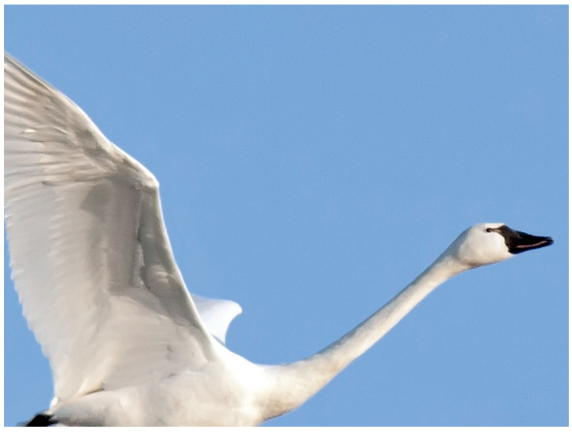
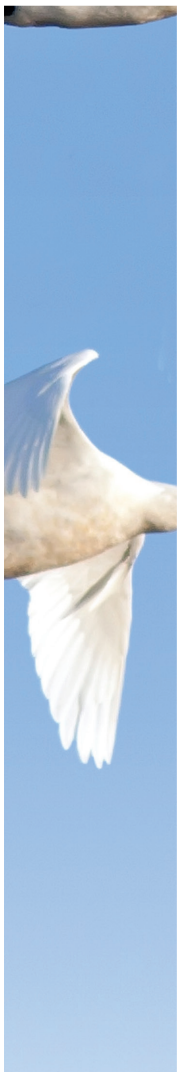
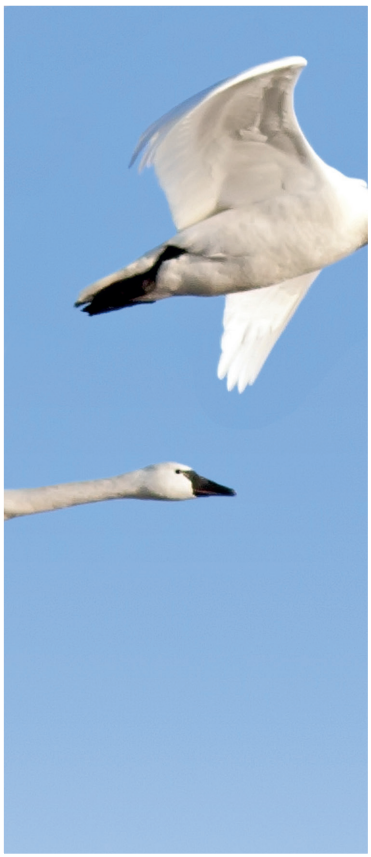
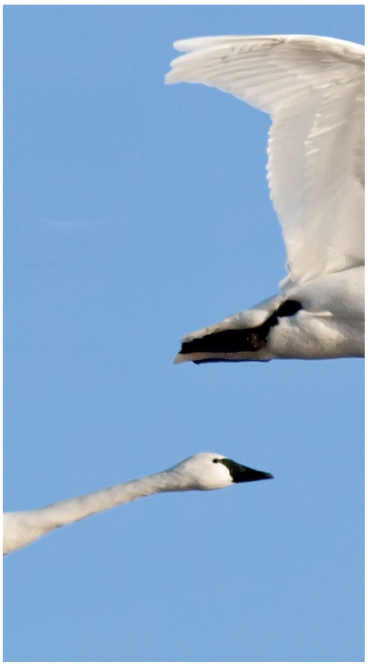
IChemE Safety Centre









Contents

Preface	4
Acknowledgements	5
How to use this supplementary guide	6
Undertaking development activities	7
Establishing competency	8
Competency definitions	9
References and further information	10
Hazard identification and risk assessment	11
Safety in design	15
Asset integrity	19
Incident reporting and investigation	23
Audit, assurance, management review and intervention	27

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 Model[1]. 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 supplementary guide will be updated as further competency development activities for each of the competency topics defined in *ISC Process Safety Competency Guidance Edition 2* are added

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

1. hazard identification and risk assessment;
2. safety in design;
3. asset integrity;
4. incident reporting and investigation;
5. audit, assurance, management review and intervention.

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Contact the ISC

email: safetycentre@icheme.org

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*

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	*Awareness plus...* • 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	*Basic application plus...* • 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	*Skilled plus...* • 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	*Awareness plus...* • 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	*Basic application plus...* • 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	*Skilled plus...* • 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	*Awareness plus...* • Basic risk assessment courses • Associate Member of an appropriate professional body (where applicable) **Courses offered by IChemE:** 1. Fundamentals of Process Safety 2. Hazard identification techniques 3. Hazard study awareness 4. Introduction to risk assessment	*Basic application plus...* • 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:** 1. Inherent safety in design and operation development 2. HAZOP 3. LOPA	*Skilled plus...* • "Fellow" equivalent of an appropriate professional body • Peer-review, co-author articles and books **Courses offered by IChemE:** 1. HAZOP study leadership and management 2. Expert hazard awareness

	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	*Awareness plus...* • 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)	*Basic application plus...* • 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	*Skilled plus...* • 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	*Awareness plus...* • Mentor or coach a junior professional to help them understand regulatory requirements and their application	*Basic application plus...* • 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	*Skilled plus...* • 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	*Awareness plus...* **Courses offered by IChemE:** 1. Fundamentals of process safety 2. Hazard identification techniques 3. Hazard study awareness 4. Introduction to risk assessment • Read Trevor Kletz book: Plant Design for Safety[5]	*Basic application plus...* • Associate member of professional body including experience undertaking design safety activities in a design / technical safety role **Courses offered by IChemE:** 1. Inherent safety in design and operation development 2. Consequence modelling techniques 3. Area classification 4. Gas explosion hazards on LNG facilities 5. Gas explosion hazards on offshore and onshore facilities 6. HAZOP 7. LOPA 8. Managing the hazards of flare systems 9. Pressure relief: protecting equipment and personnel from overpressure 10. SIL determination and hazard assessment/SIL determination and IEC 61508/61511	*Skilled plus...* • 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:** 1. HAZOP study leadership and management 2. Comprehensive explosion science 3. Expert hazard awareness

	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 though 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	*Awareness plus...* • 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	*Basic application plus...* • 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	*Skilled plus...* • 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.)	*Awareness plus...* • 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:** 1. Fundamentals of process safety	*Basic application plus...* Associate member of an appropriate professional body *Note: A large part of this is self- learning via own work or research. This education/ training may not be formally available*	*Skilled plus...* Chartered member of an appropriate professional body *Note: there is limited opportunity for further development by formal education at this competency level, which would instead be expected to deliver education*

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	*Awareness plus...* • 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	*Basic application plus...* • 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	*Skilled plus...* • 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	*Awareness plus...* • 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	*Basic application plus...* • 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	*Skilled plus...* • 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 Knowledge[6]	*Awareness plus...* • Industry accredited incident investigation course • Undertake internal incident management training	*Basic application plus...* • Associate member of professional body • Industry accredited or internal Lead Investigator or • Qualified Lead Investigator	*Skilled plus...* • Chartered member of an appropriate professional body • Professional qualifications in HSE related subject • Maintain and extend competency through appropriate Continuing Professional Development (CPD)

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	*Awareness plus...* • Understand why there are assurance processes • Participates in executing assurance activities and audits under supervision	*Basic application plus...* • Undertakes lead role in assurance activities such as audits and management reviews • Participates in the establishment of assurance plans	*Skilled plus...* • 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	*Awareness plus...* • 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	*Basic application plus...* • 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	*Skilled plus...* • 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	*Awareness plus...* • 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	*Basic application plus...* • 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	*Skilled plus...* • 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 Knowledge[6]	*Awareness plus...* • Undertake Industry accredited or internal introduction auditor training • Review reports, findings and recommendations from internal assurance activities and audits	*Basic application plus...* • Industry accredited or internal Lead Auditor training or • Qualified Lead Auditor	*Skilled plus...* • This level of competence would be involved more in imparting education Skilled plus... • Maintain and extend competency through appropriate Continuing Professional Development (CPD) • "Fellow" equivalent of an appropriate professional body

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Contact us for further information

UK
t: +44 (0)1788 578214
e: membersupport@icheme.org

Australia
t: +61 (0)3 9642 4494
e: austmembers@icheme.org

Malaysia
t: +603 2283 1381
e: malaysianmembers@icheme.org

New Zealand
t: +64 (4)473 4398
e: nzmembers@icheme.org

Singapore
t: +65 6250 0385
e: singaporemembers@icheme.org

www.icheme.org

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