# Technical Report Questionnaire Preparatory Template

# (Professional Process Safety Engineer)

You will already have completed the Technical Biography, which gave us information about your qualifications and experience. Completing the Technical Report Questionnaire (TRQ), enables IChemE to understand your technical skills, knowledge and learning in more detail so that we can determine whether you have covered the educational requirements for Professional Process Safety Engineer and/or identify areas where you need to develop your knowledge and understanding.  You can use evidence drawn from any academic qualifications you hold, or from your professional experience (or both).

On the basis of what you have already told us in your Technical Biography, **you will not need to complete all sections listed on this form**. **Please check your covering email for the sections we would like you to complete. Before you begin, please also read the Technical Report Questionnaire and Interview Guidance for Applicants, which we have also included with the covering email.**

For your technical experience, describe the work you yourself completed, rather than the management of others to carry out tasks. Where you worked as part of a team, specify what your contribution was to the overall activity, and avoid lengthy descriptions of manufacturing processes, equipment etc.

Write your responses in the first person eg “I designed…”, “I calculated...”, I was responsible for…” etc.

When completing the TRQ, you will only complete the numbered sections identified by the reviewers. To show how you meet the criteria for the relevant sections, you should provide details which draw from your qualifications and/or experience:

* **if you believe that one (or more) modules in your academic qualifications meets the requirement**
  1. List the title of the module(s) and, if possible, the university’s module code.
  2. Where possible, give the university’s description of the module’s aims (those relevant to the section), otherwise give details of what you learnt from the module.
* **if you believe that you meet the requirement through professional experience:**
  1. Indicate the context in which you gained the experience (eg a particular project).
  2. Show what you have learned relevant to the specific requirement.
  3. Where possible, indicate how you have applied, or would apply, this learning to other situations relevant to the requirement.

The word counts in each section are indicative. While your particular circumstances may occasionally require a longer response, please bear in mind that your ability to express yourself succinctly is a key professional skill. Do not exceed the word count - any Technical Report Questionnaire that is 10% or more over the total word count for the total sections required will be returned for revision by the applicant.

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| Part A. Generic AHEP4 B-Standard Engineering  By completing the required sections IChemE can determine whether you have the technical skills, knowledge and learning at a level equivalent to a UK Engineering Council accredited Bachelor’s degree programme in any engineering discipline listed by the Engineering Council.  *Note that Part A does not cover all of the expected learning outcomes of an engineering degree at Bachelor’s level: it covers only those areas which are not superseded by learning at Master’s level. In particular, most requirements which might be expected to be covered in Part A1 are superseded by the requirements of Part B.*  **Evidence may comprise application in any engineering discipline.** | |
| **Part A1. Engineering Principles, Science and Mathematics**  Application of knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems | |
| Assessment criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **A1.1**  Evidence of:   * application of an integrated or systems approach to the solution of complex problems as would be expected following completion of a relevant engineering degree, relevant technical experience or similar.   Use 150–250 words |  |
| **Part A2. The engineer and society**  Engineering activity can have a significant societal impact and engineers must operate in a responsible and ethical manner, recognise the importance of diversity, and help ensure that the benefits of innovation and progress are shared equitably and do not compromise the natural environment or deplete natural resources to the detriment of future generations. | |
| Assessment criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **A2.1**  Evidence of knowledge of:   * identification and analysis of ethical concerns; * making reasoned ethical choices informed by professional codes of conduct.   Use 150–250 words |  |
| **A2.2**  Evidence of knowledge of:   * use of a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.   Use 150–250 words |  |
| **A2.3**  Evidence of knowledge of:   * the adoption and application of a holistic and proportionate approach to the mitigation of security risks. Could include examples from: * protection of facilities, products and process materials against damage, * harm or negligence; * cyber and automation security; and * technology and information storage and transfer.   Use 150–250 words |  |
| **A2.4**  Evidence of knowledge of:   * the adoption and application of an inclusive approach to engineering practice, recognising the responsibilities, benefits and importance of supporting equality, diversity and inclusion.   Use 150–250 words |  |
| **Part A3. Engineering practice**  The practical application of engineering concepts and tools, engineering and project management, teamwork and communication skills. Engineers also require a sound grasp of the commercial context of their work, specifically the ways an organisation creates, delivers and captures value in economic, social, cultural or other contexts. | |
| Assessment criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **A3.1**  Evidence of:   * the use of practical laboratory and/or workshop skills to investigate complex problems.   Use 150–250 words |  |
| **A3.2**  Evidence of knowledge of:   * selection and application of appropriate materials, equipment, engineering technologies and processes, recognising their limitations.   Use 150–250 words |  |
| **A3.3**  Evidence of knowledge of:   * understanding the role of quality management systems and continuous improvement in the context of complex problems.   Use 150–250 words |  |
| **A3.4**  Evidence of:   * application of knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.   Use 150–250 words |  |
| **A3.5**  Evidence of:   * ability to plan and record self-learning and development as the foundation for lifelong learning/CPD.   Use 150–250 words |  |

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| Part B. Advanced Process Safety Engineering  In answering the following sections, you need to demonstrate learning at an advanced level with evidence of:   * ability to handle uncertainty and complexity * ability to familiarise yourself with the new and unknown * ability to develop innovative approaches * ability to communicate and influence process safety culture * an understanding of process safety management * some understanding of the limits of available technology and of the potential of new and emerging methods * a broad understanding of related subjects | |
| **B1. Fundamentals and Quantitative Principles**  Learning outcomes in this area are, effectively, the core of process safety engineering and will usually be characterised as building on and deepening the knowledge, understanding and skills already obtained from a first cycle degree or professional experience.  As an applicant, you will have developed skills associated with the application of the technical tools used to identify and assess process safety hazards, and with their strengths and weaknesses, and common errors in their use. You will have a more detailed knowledge of the more technical aspects such as gas dispersion, probability estimation and consequence assessment. You will also be familiar with the development and use of risk criteria and be able to develop a logical demonstration of compliance. | |
| Assessment Criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **B1.1 Tools to identify and assess process safety hazards**  You should provide evidence of:   * an ability to identify, assess and quantify process hazards using a range of industry-standard methods with awareness of their limitations and consideration of relevant past events; * a knowledge of risk reduction measures (and their hierarchy) in terms of process design and of prevention and mitigation techniques.   Use 150 – 250 words |  |
| **B1.2 Incident Investigation**  You should provide evidence of:   * an understanding of the basic principles of incident investigation; * an understanding of how to identify and implement the lessons learned with corrective measures.   Use 150 – 250 words |  |
| **B2.** **Engineering Analysis**  Engineering analysis involves the application of engineering concepts and tools to analyse, model and solve problems. At higher levels of study engineers will work with information that may be uncertain or incomplete.  As an applicant, you should demonstrate your understanding of the application of relevant process safety regulations, and Process Safety Management techniques in an engineering context. | |
| Assessment Criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **B2.1 Understanding and application of relevant regulations**  You should provide evidence of:   * an understanding of the purpose and the limitations of process safety regulations, standards, guidance and industry best practice, with some knowledge of applicable local and global legislative frameworks; * awareness of how the legislative framework applies to the management of safety, health and environment in workplaces, from the perspectives of all involved.   Use 150 – 250 words |  |
| **B2.2 Process Safety Management (PSM)**  You should provide evidence of:   * an understanding of the purpose, elements, implementation and audit of a Process Safety Management System.   Use 150 – 250 words |  |
| **B3. Design and Innovation**  Design is the creation and development of an economically viable product, process or system to meet a defined need. Applicants are required to be able to design solutions for complex problems that evidence some originality and meet a combination of societal, user, business and customer needs as appropriate.  As an applicant, you must display competence in process safety engineering aspects of design, including a knowledge of the evaluation and asessment of hazards that have occurred or could potentially occur. You should demonstrate an understanding of the key aspects of hazard evaluation throughout a project life cycle, and the ability to address the complexity issues arising from the interaction and integration of the different parts of a process or system. | |
| Assessment Criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **B3.1 Process Safety in Design**  You should provide evidence of:   * an understanding of the concepts of inherently safer process design, including the advantages and disadvantages of typical approaches such as risk-based and code/standard-based; * an understanding of the benefits of multiple barriers and knowledge of typical process examples.   Use 150 – 250 words |  |
| **B3.2 Emergency planning**  You should provide evidence of:   * knowledge of the key aspects of on-site and off-site emergency response planning, including procedures, communications, training, testing, roles and responsibilities; * awareness of the relevant regulatory requirements pertaining to the protection of people during major accidents. Understanding of how to define emergency actions for hazards identified;   Use 150 – 250 words |  |
| **B4. The Engineer and Society**  Engineering activity can have a significant societal impact: engineers must operate in a responsible and ethical manner, recognising the importance of diversity. They should help ensure that the benefits of innovation and progress are shared equitably while neither compromising the natural environment nor depleting natural resources to the detriment of future generations.  As an applicant, you should be able to evaluate the environmental and societal impact of solutions to complex problems (to include the entire life cycle of a product or process) and minimise adverse impacts. | |
| Assessment Criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **B4.1 Protection of Society and the Environment**  You should provide evidence of:   * the knowledge and understanding required to apply process safety principles to reduce societal and environmental risk.   Use 150 – 250 words |  |
| **B4.2 Human Factors**  You should provide evidence of:   * an understanding of the key Human Factors affecting process safety, such as ergonomic design and human performance, and how these can be actively managed to reduce risk; * have the knowledge to manage organisational change, safety culture and safety-critical communications.   Use 150 – 250 words |  |
| **B4.3 Safety culture**  You should provide evidence of:   * an understanding of the meaning and importance of safety culture; * an ability to assess safety culture; * a knowledge of means of changing and improving safety culture.   Use 150 – 250 words |  |
| **B4.4 Leadership**  You should provide evidence of:   * an understanding of the role of leadership in promoting and sustaining good process safety management; * an understanding of organisational measures to provide assurance that process safety risks are being correctly managed.   Use 150 – 250 words |  |
| **5. Engineering Practice**  Applicants must understand the ways in which process safety engineering knowledge can be applied in practice, such as in: operations and management; projects; providing services or consultancy; developing new technology. Typical learning outcomes include an in depth understanding of the identification, assessment, elimination, minimisation, prevention control and mitigation of potential process hazards. Applicants will be able to apply an integrated approach to process safety and environmental protection, typically through significant project work.    Your evidence could, for example, demonstrate some of the following applied to a suitable example:   * an understanding of typical factors that contribute to barrier effectiveness and the role of critical activities; * critical analysis of incidents, their causes and consequences from specific examples and making recommendations to prevent reoccurrence; * an understanding of the main elements of a management system that ensures potential hazards can be adequately controlled and managed; * the application of process safety management methods and originality in dealing with uncertainty, new concepts and/or applications; * the communication of the outcomes of the work in a professional manner such as a technical report; publication; poster; presentation. | |
| Assessment Criteria | Applicant self-assessment  **In the box below, provide details such as module descriptors (with learning outcomes and level) for qualifications and/or experiential understanding gained through work roles or projects.** |
| **B5.1** You should provide evidence of attainment of advanced process safety engineering practice in its broadest sense as described above. This may be done using an example of a major project, a combination of projects, industrial report, or dissertation you have undertaken.  Use 300 – 500 words |  |