



Department of **Energy, Mines,
Industry Regulation and Safety**



GUIDE

Facility design case

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Reference

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Foreword

Western Australia's work health and safety (WHS) legislation came into force in March, 2022. This resulted in the amendment of the various petroleum Acts and the repeal of the associated regulations so that all onshore and offshore petroleum, pipeline and geothermal energy operations are now subject to the requirements of the:

- *Work Health and Safety Act 2020* (the WHS Act)
- Work Health and Safety (Petroleum and Geothermal Energy Operations) Regulations 2022 (WHS PAGEO Regulations).

A key responsibility for the WorkSafe Group (WorkSafe) of the Department of Energy, Mines, Industry Regulation and Safety continues to be the ongoing risk management and safety requirements for the onshore and offshore petroleum, pipeline and geothermal energy operations. To support these requirements, the guides previously developed have been updated to provide support and assist operators to meet their commitments under the WHS Act and WHS PAGEO Regulations.

Application

This Guide is a non-statutory document provided by WorkSafe to assist persons subject to duties under the WHS Act and requirements to conduct audits of the safety management system as prescribed by the WHS PAGEO Regulations.

It has been developed to provide advice and guidance to operators to meet the WHS Act and the WHS PAGEO Regulations requirements administered by WorkSafe.

Who should use this Guide?

You should use this Guide if you are:

- the operator of onshore or offshore petroleum, pipeline or geothermal energy operations under the WHS Act
- responsible for maintenance of a safety management system and in particular management of change.

WHS legislation

Under the WHS Act, the WorkSafe Commissioner is responsible for performing the functions and exercising the powers of the regulator. Each safety document must be submitted for acceptance by the regulator.

WorkSafe assists the regulator in the administration of the WHS Act and the WHS PAGEO Regulations, including the provision of staff to oversee compliance with the legislation.

For facilities outside Western Australian waters, the WHS Act does not apply and guidance should be sought from National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). If a vessel does not fall under the definition of “facility” in the Act, operators should contact the Australian Maritime Safety Authority and Department of Transport.

No petroleum or geothermal operations can be conducted on any onshore or offshore petroleum, pipeline or geothermal energy operations unless the facility has an operator registered in accordance with the requirements of WHS PAGEO Regulations.

The WHS PAGEO Regulations provided for transitional provisions in relation to facility operators and safety cases in place or submitted before the commencement of the WHS legislation.

| | |
|--|-----|
| Foreword | III |
| 1 Introduction..... | 2 |
| 1.1 Innovation in the petroleum industry..... | 3 |
| 1.2 Aims and outcomes of a facility design case | 3 |
| 1.3 Liaison with the regulator | 4 |
| 1.4 Involvement of workers | 4 |
| 1.5 Integration of human factors in design and engineering | 5 |
| 2 Facility design case | 7 |
| 2.1 Scope and coverage | 8 |
| 2.2 Overview of design philosophy..... | 8 |
| 2.3 Safety and reliability objectives in design..... | 8 |
| 2.4 Engineering policies and processes | 9 |
| 2.5 Processes applied to petroleum and geothermal energy resources | 9 |
| 2.6 Design life of the facility..... | 9 |
| 2.7 Any other items considered appropriate | 10 |
| 3 Regulator’s response to facility design case submission..... | 11 |
| Appendix 1. Glossary..... | 12 |
| Appendix 2. Further information | 14 |

1 Introduction

WHS PAGEO Regulations r. 25
Submission of facility design case

This Guide has been developed to provide operators with assistance to develop and submit a facility design case (FDC), and recognise when an FDC is warranted.

For the purpose of this Guide, the term “safety case” is used to cover all of the safety documents referred to in the WHS PAGEO Regulations.

The term “facility” covers offshore and onshore facilities and pipelines, including above ground structures.

The term “operator” is used to refer to an operator, nominator or prospective nominator.

The objective of this Guide is to provide clarity to industry on areas of the legislation which may be ambiguous or open to interpretation.

1.1 Innovation in the petroleum industry

Innovation is a growing trend in new petroleum developments. The regulator recognises that operators can develop innovative design features and still control health and safety risks.

Innovative solutions pose challenges for the regulator and usually require more evaluation time. The operator should engage in early dialogue with the regulator about the distinctive features of a new facility, and why they bring new or modified safety challenges and solutions. It is beneficial to address safety design matters at the earliest possible stage in a project, and the WHS PAGEO Regulations create a new process for early engagement.

The FDC is not mandatory. It is an opportunity to obtain feedback on the design of a facility, and is not formally accepted or rejected by the regulator. Following review by the regulator, any comments on the contents of the FDC will be forwarded to the operator in writing.

The FDC will not influence the regulator's eventual decision to accept (or reject) the formal facility safety case. However, early engagement should lead to a smoother, surprise-free safety case assessment process.

1.2 Aims and outcomes of a facility design case

The FDC is aimed at innovative or non-standard petroleum developments. The operator must decide whether an FDC is appropriate for their proposed facility by considering whether it:

- will use new technology, new applications for existing technology, new materials, new types of plant
- will use new operating philosophies or safety management systems e.g. minimum manning, remote monitoring, data gathering and analysis, or artificial intelligence
- is a new facility that differs in design, technology or complexity compared to operator's existing facilities
- has complex, multi-stage field development plans
- is an existing facility where material changes may introduce hazards and risks.

The FDC is not intended for petroleum facilities of 'conventional' design, where the operator and regulator can be confident that the hazards and risks are clearly understood, and can be managed effectively by adopting well-established safety solutions. An example of a conventional design solution is a floating production storage and offloading unit for an oil development in moderate water depths.

The preparation and submission of an FDC to the regulator gives the operator an opportunity to:

- provide the regulator with an overview of the proposed new design for a facility or operation for review and discussion
- provide information on the process used to select the new design or new plant or technology, and the reason for negating other design or equipment options
- provide information on the process used to select control measures for eliminating or reducing risk and to demonstrate that the risks have been reduced so far as is reasonably practicable (SFAIRP)
- at a later time, develop a safety case for the facility which takes comments received from the regulator regarding the proposed design into account.

1.3 Liaison with the regulator

If the operator considers that an FDC is necessary, they should arrange to liaise with the regulator prior to commencing development of the FDC to outline their proposed development and submission. Interacting with the regulator early in the process will provide the basis of a good working relationship between the operator and the regulator.

The intent of the FDC is to enable the operator to provide the regulator with details of the engineering and design of a new facility. The focus should be on the safety and risk management processes to be employed in the design of the facility, as well as details of:

- the proposed layout, plant and control systems
- how the facility will be expected to operate
- the proposed ongoing operation and maintenance of the facility
- the hazard identification and risk management processes used to provide a healthy and safe environment for the workforce.

Providing these details to the regulator can give the operator insight into the proposed construction, and enable the identification of potential issues or concerns which can then be reviewed and, if appropriate, rectified.

The regulator does not provide a consultancy service to review drafts prior to submission of an FDC.

1.4 Involvement of workers

WHS PAGEO Regulations r. 38
Involvement of workers

Workers should be involved in consultation as early as possible in the hazard identification and risk management process for new facility designs and significant changes to existing facilities and operations.

The FDC should demonstrate the consultation with, and participation of workers in the hazard identification and risk management process for the new or changed design.

Worker involvement provides the engineering and design teams with insight into the safe operational aspects of the new or changed facility. This early participation allows workers to gain a better understanding of how the new design will impact their day to day duties and the management of identified hazards resulting in better management of change when the new design or changes are put into operation. For proposed new facilities, workers from similar sites or operations should be invited to participate in these early engineering and design sessions.

The Involvement of workers: Guide and Human Factors Fundamentals for petroleum and major hazard facility operators: Guide may assist with this requirement.

1.5 Integration of human factors in design and engineering

WHS Act Section 19

Duty of care

WHS PAGEO Regulations r. 38

Involvement of workers

WHS PAGEO Regulations r. 32(3) and r.32 (4)

Formal safety assessment, and safety management system

WHS PAGEO Regulations rr. 108-112

Managing risks to health and safety

The integration of human factors into the design and engineering of new or modified petroleum and geothermal energy operations means systems are designed in a way that optimises human performance and minimises potential for design-induced risks to occupational safety and health, and process safety, and reduces the ongoing costs over the life of a facility.

The consideration and inclusion of human factors during the initial design and engineering phase is one of the most effective and efficient means of minimising design-induced human errors in the areas of prevention, initiation, detection, control, escalation, mitigation and emergency response to hazards and major accident events (MAE).

The FDC submitted to the regulator should clearly describe how human factors have been systematically integrated into the design of the new or modified operations to manage the risk of hazards and MAEs. An FDC that does not demonstrate the consideration of human factors may not be sufficient to demonstrate the risks associated with hazards and MAEs have been reduced SFAIRP.

Successful systematic integration of human factors through the lifecycle of the design process may be achieved by:

- demonstrating management commitment to human factors and the appointment of a human factors champion during all phases of the design project
- developing an Human factors integration plan (HFIP) which outlines the key human factors activities through all phases of the project, starting at the concept phase
- an early focus on known human factors problems and lessons learnt from previous projects or facilities should be included in the project plan
- including accepted human factors design standards within the project specifications
- defining specific and appropriate performance measures to measure progress and success with the integration human factors
- considering human factors design constraints in the same way, and with equal emphasis, as any other technical constraints
- applying a multi-disciplinary approach to the design process (e.g. cooperation and collaboration between human factors personnel, safety managers, engineering disciplines, and operations and maintenance representatives)
- consulting with workers who will be involved in the operation of the new or modified facility during hazard identification and risk assessment consultations which are generally held during the concept and front end engineering design phases of the project. Front line operators can contribute meaningfully through identifying ways to improve the design by taking account of human capabilities and limitations to optimise human performance, safety and production
- implementing processes for human factors review and validation.

The guidance listed below can provide operators with assistance with integrating human factors into the risk management of hazards and MAEs.

- *Code of practice: Psychosocial hazards in the workplace*
- *Guide: Human factors fundamentals for petroleum and major hazard facility operators*
- *Human factors self-assessment guide and tool for safety management systems at petroleum and major hazard facility operations.*

2 Facility design case

WHS PAGEO Regulations r. 25

Submission of facility design case

The FDC's principal purpose is to provide the regulator with enough substantive information about the design and the project as a whole to:

- frame and describe the relevant matters
- enable a meaningful dialogue on the matters
- conduct an objective assessment of the design
- allow the regulator to provide the operator with relevant feedback.

The operator's decision to engage with the regulator through the FDC process may be a direct outcome of the assurance activities conducted by project stakeholders as an essential element of the project delivery process.

The operator should submit the FDC when there is enough relevant information for the regulator to provide comment.

Ideally, the operator will have conducted sufficient engineering activities to be able to provide a concept design package. It is likely this design package will have similar scope and content to the materials an operator might be expected to provide for their internal approval decision process.

The FDC dialogue must be at a technical level, and submitted when there is sufficient engineering development to justify the regulator's assessment of a design dossier.

The FDC should also provide details of the project's overall risk management processes, to demonstrate to the regulator that risks will be controlled so far as is reasonably practicable.

The FDC should **not** be used for speculative discussions about an unproven concept. It should have a focus on the key design decisions, how those were identified and evaluated, how solutions were devised, and how final decisions were made.

The operator should submit the FDC at a stage in the project that still allows (potentially significant) design changes to be made. The sections below detail the information required to be included, as a minimum, in the FDC and includes examples of methodology used to arrive at the desired level of health and safety, including the human factors elements, in the life cycle of the facility or operations.

2.1 Scope and coverage

The regulator should be provided with sufficient information to be able to conduct a meaningful evaluation and provide objective feedback.

The scope and coverage section should include a detailed overview of the proposed facility or operation, and the location of the new or changed facility including the anticipated site layout and a location map.

The site layout for both onshore and offshore facilities should include details of the location of any proposed new wells, existing wells and product export arrangements.

This information is usually available in an existing key project document such as the design basis memorandum, statement of requirements, design brief or functional specification. This key project document should also summarise the key project risk drivers in an appropriate form.

2.2 Overview of design philosophy

The FDC should include details of the design philosophy and its supporting principles, and describe how these will be put in practice throughout the design phase for the facility or operation.

The FDC should describe the overall project design philosophy and explain how the project has been organised to ensure a robust, risk-led design approach in terms of:

- safety design philosophy
- functional safety requirements
- major accident events (MAEs)
- the inherent safety approach
- controls and design performance standards.

2.3 Safety and reliability objectives in design

The FDC should describe the decision-making process for key design decisions, particularly key safety design decisions. Include details of how the project identifies, evaluates and selects safety solutions in this section.

This information should be presented to explain and justify:

- the selected development option
- the distinctive elements of the concept design
- major accident hazards and risks
- key features of the proposed safety solutions
- standards of performance required from safety critical elements (SCEs)
- any compromises entailed by the solutions.

2.4 Engineering policies and processes

The FDC should describe the engineering policies and processes applied to ensure the safety and reliability objectives will be met.

This section should detail the process in place used to move through each engineering and design phase, and demonstrate how verification and validation requirements are used by engineering teams to ensure that the design requirements remain valid and meet safety and reliability objectives.

The operator should provide examples of elements of design that were initially considered and then rejected to demonstrate the overall engineering and design process, and show how the chosen design was validated.

It may be useful to include a process flow chart covering the main activities and decision phases for the design and engineering process.

2.5 Processes applied to petroleum and geothermal energy resources

The FDC should outline a list of the various assemblies that make up the facility and a brief description of their function, including details of:

- activities that will, or are likely to, involve the facility and the operational parameters
- the machinery and equipment to be installed on the facility and how these will operate and be maintained
- the technical controls and safety measures that will be in place
- identified safety critical elements
- utilities and how they will function, e.g. lighting, water, waste and communications
- emergency response
- any fire and gas explosion analysis or evacuation, escape and rescue analysis that has already been conducted.

2.6 Design life of the facility

The operator should include details of the design parameters for the minimum operating life of the facility.

Where appropriate, this should be broken down into the various assemblies that make up the overall facility, as not all assemblies will have the same operating life. For example, electronics and some electrical equipment may have a significantly shorter operating life span than pipeline assemblies.

The FDC should include details of the proposed integrity management procedures and processes that will be used to periodically review and assess the operating life across the facility, including regular inspections and integrity reports.

2.7 Any other items considered appropriate

The operator should also include details of any other features that are proposed for the new facility that may be outside the areas listed.

This may include the:

- reasons for using the new design or new components that have not previously been used in similar facilities
- anticipated improved safety of the new design
- cost benefits associated with the operation of the new facility
- improved operation and safety features, taking into account the surrounding land use near the new facility.

3 Regulator's response to facility design case submission

WHS PAGEO Regulations r. 25(4)
Submission of facility design case

The regulator must respond within 90 days of receiving an FDC. The regulator will provide written comments to be considered by the operator, or provide a written statement that there are no comments in relation to the FDC.

Appendix 1 Glossary

The following terms are defined for the purposes of this Guide.

| Key terms | Meaning |
|--|--|
| Facility | <p>Geothermal energy facility – a place at which geothermal energy operations are carried out and includes any fixture, fitting, plant or structure at the place</p> <p>Petroleum facility – a place at which petroleum operations are carried out and includes any fixture, fitting, plant or structure at the place</p> <p>Mobile facility – includes an onshore drilling rig</p> <p>The term facility has been adopted throughout this document to cover offshore and onshore facilities and pipelines including aboveground structures associated with onshore pipelines.</p> |
| Facility design case | A facility design case is a document that sets out a broad overview of the design of a facility |
| Geothermal energy operation | <p>Means an operation to:</p> <ul style="list-style-type: none"> • explore for geothermal energy resources • drill for geothermal energy resources • recover geothermal energy, or • is any other kind of operation that is prescribed by the regulations to be a geothermal energy operation for the purpose of this definition <p>and carry on of such operations and the execution of such works as are necessary for that purpose.</p> |
| HFIP | Human factors integration plan |
| MAE | Major accident events – an event connected with a facility, including a natural event, having the potential to cause multiple fatalities of persons engaged at or in the vicinity of the facility |
| Operator | A person who has, or will have, the day-to-day management and control of operations at a facility and is registered as the operator of the facility under r.22(3). |
| Person conducting a business or undertaking (PCBU) | A PCBU is an umbrella concept capturing all types of working arrangements or relationships. A PCBU includes a company, unincorporated body or association and sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A reference to a PCBU includes reference to the operator of a facility. |

| Key terms | Meaning |
|-------------------------------|--|
| Performance standard | A standard established by the operator defining the performance required for a safety critical element typically defining the functionality, availability, reliability, survivability and interdependency of the safety critical element |
| Petroleum operation | Means an activity that is carried out in an area in respect of which a petroleum title is in force, or that is carried out in an adjacent area, for the purpose of any of the following: <ul style="list-style-type: none"> • exploring for petroleum • drilling or servicing a well for petroleum • extracting or recovering petroleum • injecting petroleum into a natural underground reservoir • processing petroleum • handling or storing petroleum • the piped conveyance or offloading of petroleum |
| Prospective nominator | A person who intends to nominate another person to be the operator of a facility under r.21(2) |
| Regulator | The WorkSafe Commissioner is the regulator under the <i>Work Health and Safety Act 2020</i> |
| Safety critical element (SCE) | Any item of equipment, system, process, procedure or other control measure the failure of which can contribute to an MAE |
| SFAIRP | So far as is reasonably practicable |
| WHS Act | <i>Work Health and Safety Act 2020</i> |
| WHS PAGEO Regulations | Work Health and Safety (Petroleum and Geothermal Energy Operations) Regulations 2022 |
| Worker | Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer |

Appendix 2 Further information

Petroleum safety guidance

Interpretive guidelines

- *Development and submission of a diving safety management system*
- *Development and submission of a safety case*
- *Development and submission of an onshore facility safety case – drilling operations*

Guides

- *Audits, review and continual improvement*
- *Bridging documents and simultaneous operations (SIMOPS)*
- *Dangerous goods and hazardous chemicals in petroleum, pipeline and geothermal energy operations*
- *Decommissioning and management of ageing assets*
- *Demonstration of risk reduction so far as is reasonably practicable (SFAIRP)*
- *Diving start-up notices*
- *Emergency response planning*
- *Facility design case*
- *Hazard identification*
- *Health and safety leading and lagging performance indicators*
- *Human factors fundamentals for petroleum and major hazard facility operators*
- *Human factors self-assessment guide and tool for safety management systems at petroleum and major hazard facility operations*
- *Identification of major accident events, control measures and performance standards*
- *Inspections – Land-based drilling rigs*
- *Involvement of workers*
- *Management of change*
- *Nomination of an operator*
- *Records management including document control*
- *Risk assessment and management including operational risk assessment*
- *Validation requirements*

Codes of practice

- [*Mentally healthy workplaces for fly-in fly-out workers in the construction and resources sector*](#)
- *Psychosocial hazards in the workplace*
- [*Safe design of structures*](#)
- *Workplace behaviour*

See the WorkSafe website for [approved codes of practice](#) on a range of related topics such as *Managing the risks of hazardous chemicals in the workplace*, *Confined spaces*, *Managing the risk of falls at workplaces*, *Managing risks of plant in the workplace* and *Managing the work environment and facilities*.

Australian and international standards

- AS/NZS ISO 31000 *Risk management – Principles and guidelines*
- IEC ISO 31010 *Risk management – Risk assessment techniques*
- ISO 17776 *Petroleum and natural gas industries – Offshore production installations – Major accident hazard management during the design of new installations*
- AS IEC 61511 *Functional safety – Safety instrumented systems for the process industry sector*
- AS 2885 (suite) *Pipelines – Gas and liquid petroleum*
- AS IEC 61882 *Hazard and operability studies (HAZOP studies) – Application guide*

Other resources

WorkSafe WA

- [How to determine what is reasonably practicable to meet a health and safety duty: Interpretive guideline](#)
- [Incident notification: Interpretive guideline](#)
- [The health and safety duty of an officer: Interpretive guideline](#)
- [The meaning of 'person conducting a business or undertaking' \(PCBU\) – Interpretive guideline](#)

Other agencies

- NOPSEMA, [Information Paper: Human factors in engineering and design](#)
- Safe Work Australia, [Handbook: Principles of good work design](#)



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