4.1 OVERVIEW

PDO activities have the potential to harm people and the environment, to cause damage or loss to assets, to defer oil production, to cause financial loss, and to adversely impact the Company's reputation. A Hazards and Effects Management Process (HEMP) provides a structured approach to managing the hazards and potential effects of PDO's activities. There are numerous techniques to carry out HEMP, and the technique chosen should be aligned to the scope of work, risk scenarios in that work, etc. Once this is known, an appropriate technique can be chosen, such as Hazard Identification (HAZID), Hazards Analysis (HAZAN), Hazards & Operability (HAZOP), Task Risk Assessment (TRA), Quantitative Risk Assessment (QRA), Job Safety Plan (JSP), etc.

Effective application of HEMP involves four steps: identify, assess, control, and recover, and all steps will generate records. These steps cover identification of the major hazards to people and the environment, assessment of the related risks, as well as implementing measures to control these risks, and to recover in case these measures fail.

Although these steps are often described sequentially, in practice they overlap and are not always distinct. HEMP is an iterative process, i.e., a repetitive process wherein the HEMP cycle is ongoing and dynamic because the risk picture in PDO is always subject to change as well. HEMP is also a spoken process, ideally conducted using a team approach where everybody on the team is encouraged to provide their input and knowledge of the threats, hazards, and risks involved, as well as the resulting event that could occur.

This chapter:
- Introduces PDO's Hazards and Effects Management Process (HEMP) and describes its role within PDO's HSE Management System.
- Describes each stage of HEMP.
- Describes some commonly used HEMP tools and techniques to assist in developing and implementing each step.
- Describes the general scope of each step and also provides detailed procedures for carrying out and reporting each step.
- Provides additional information sources for implementing HEMP.

4.2 REQUIREMENTS

HEMP shall be conducted for new assets, facilities, and/or activities as well as regularly for existing facilities or operations whenever major changes take place. HEMP shall cover the lifecycle of asset / facility as illustrated below:

<table>
<thead>
<tr>
<th>LIFECYCLE STAGE</th>
<th>FOCUS OF HEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning for new assets, facilities, and/or operations</td>
<td>Identification and assessment of threats, hazards, and effects that may be avoided, reduced, and/or eliminated.</td>
</tr>
<tr>
<td>Reviewing existing assets, facilities, and/or operations</td>
<td>Identification and assessment of threats, hazards, and effects that may be avoided, reduced, and/or eliminated.</td>
</tr>
</tbody>
</table>
| Operational and maintenance stages for all assets, facilities, and/or operations | - Development and implementation of effective controls for HEMP.  
- Development and implementation of effective recovery preparedness measures.  
- Identification of new hazards particularly in non-routine operations. |
### LIFECYCLE STAGE | FOCUS OF HEMP
--- | ---
Establishing a new Contract or renewing an existing Contract | Identification and assessment of the major threats, hazards, and effects associated with the Contract so that the Contractor and/or Sub-Contractor can:
- Develop and implement effective controls for hazards and effects management.
- Develop and implement effective recovery and emergency preparedness measures.
Planning for abandonment and decommissioning | Identification and assessment of threats, hazards, and effects that may be avoided, reduced, and/or eliminated.
Abandonment and decommissioning | Safe clean up and rehabilitation.

### 4.3 PROCEDURES – IDENTIFY

The first stage in HEMP is to systematically identify the potential health, safety, and environmental threats, hazards, and effects of your activities and operations. Threats, hazards, and effects identification is conducted at an early stage in the design and development of new facilities, equipment, and/or processes. This permits sound HSE practices, systems, and equipment to be ‘designed-in,’ and allows for a wider choice of hazard prevention, risk reduction, mitigation, and recovery measures to be employed than with existing facilities. Continual hazard identification and risk reduction is required at existing facilities to maintain and improve HSE performance. Threats, hazards, and their consequences can be identified and assessed in a number of ways, ranging from the simple to the complex, as shown in the order below:

- Through experience and judgment.
- Using checklists.
- By referring to regulations, codes, and/or standards.
- By undertaking more structured review and analytical techniques.

This first stage in HEMP also begins the formal process of documenting and recording the HEMP process. This is an important activity in that it creates a “risk history” for the organization, and provides traceability when managing risk overall. This stage is also where risk(s) can begin to be ‘registered,’ whereby a Company, Asset, or local risk register is established and populated with results of HAZID activities, for example.

#### 4.3.1 Scope of Identification

Identification of threats, hazards, and effects should cover the following:

- All activities, products, and/or services controlled by PDO, and those influenced by PDO, such as supplier, contractor, and sub-contractor activities.
- All activities, products, and/or services carried out by all personnel having access to the workplace and facilities at the workplace including suppliers, contractors, and sub-contractors.
- Routine (frequently performed), non-routine (infrequently performed), and/or emergency operating conditions and activities. Sometimes the categories of normal and abnormal operating conditions are also considered.
- The lifecycle of an asset or activity, from the planning stage, through operation to decommissioning, and disposal and restoration.
4.3.2 HEMP Tools - Identification

One or more of the following tools may be selected to assist in identifying threats, hazards, and effects. This selection may depend on the information available, the scope and/or phase of the activity or project, and/or maturity of the operation.

Structured review techniques reflect collective knowledge and experience, and sometimes are codified into regulations, codes, and/or standards. Generally focused on hazard identification, assessment, and control, they contain specific information on hazards and their management for particular operations and activities.

Checklists are a useful way of ensuring that known threats and hazards have all been identified and assessed. However, use of checklists shouldn’t limit the scope of the review because checklists should be customized to the area in which they are applied, perhaps entailing adding several categories to them. Hazard and Effects Registers are particularly useful as well, as they capture the knowledge derived from using the checklist(s).

Knowledge and the judgment of experienced staff is invaluable for threat and hazard identification, assessment, and control, particularly direct feedback from incidents, accidents, near misses, and Job Safety Plans.

4.4 PROCEDURES – ASSESS

The second stage in HEMP is to assess the health, safety, and environmental risks of all activities, and then to rank these risks. Once the hazards and effects have been identified, their consequences and likelihood can be assessed, evaluated, and the risk level determined. It is important to contrast quantitative risk assessment (QRA) with qualitative risk assessment. Neither is a “better” means of evaluating risk than the other, and either or both can be a valid means of evaluation of a particular risk.

Both methods use the same basic steps of hazard identification, consequence assessment, and exposure assessment in order to characterize risk. The primary differences in the methods are the level of complexity in these steps, as well as the level of experience and expertise of the personnel carrying out the assessment and a commensurate increase in the resources required to complete the exercise. Typically, qualitative risk assessment is used 1), to determine if a quantitative assessment is required, and 2), as a screening tool prior to the completion of a quantitative assessment.

4.4.1 Scope of Qualitative Risk Assessments

Risk assessment of hazards and effects should cover the following:

- All activities, products, and/or services controlled by PDO, and those influenced by PDO, such as supplier, contractor, and subcontractor activities.
- All activities, products, and/or services carried out by all personnel having access to the workplace and facilities at the workplace including suppliers, contractors, and sub-contractors.
• Routine (frequently performed), non-routine (infrequently performed), and/or emergency operating conditions and activities. Sometimes the categories of normal and abnormal operating conditions are also considered.

• The lifecycle of an asset or activity, from the planning stage, through operation to decommissioning, and disposal and restoration.

Qualitative methods are best used for risk assessments of simple facilities or operations, where the exposure of the workforce, public, environment, and/or asset is low. Qualitative risk assessments are typically a combination of judgment, opinion, and experience, and using structured review techniques with as much available risk information as possible.

Qualitative risk assessments should be carried out with input from those people directly involved with the risk, using a team approach. The logic here is that those directly involved with the risk have the greatest self-interest and "buy-in" to subsequently control it.

Many structured review techniques have and use subjective or qualitative evaluation of risk. Techniques such as simple risk assessment, task risk assessment, structured brainstorming, and group risk assessments are useful here, and by their nature require team approaches. Procedures or guidelines detailing how to do these techniques should be available for risk assessment teams to refer to and use.

Risk assessments can be undertaken using experience and judgment. A team approach is highly recommended because: 1) no one individual knows everything about the situation being assessed; 2) the quality of risk decisions tends to be higher and more accurate when done with a team; 3) the team approach gets involvement, especially when involving employees and contractors who face the risk; 4) risk decisions by a team also get higher levels of ownership, as the team also participates in determining and ultimately implementing the risk controls they have determined as most effective.

4.4.2 HEMP Tools – The PDO Risk Assessment Matrix (RAM)

The HSE Risk Assessment Matrix (shown below) shall be used to assess and evaluate HSE risks. This matrix shows risk as the product of likelihood (or probability) and consequence (or impact). Likelihood here also incorporates the assessment of frequency, as frequency is a major influence on probability, the logic typically applying that the higher the frequency the higher the probability. Consequence is measured against the level of severity or “how bad” the outcome could be. It needs to be noted that there is often more than one consequence, in that one event could lead to primary, secondary, tertiary consequences, etc. For example, in process safety incidents, the consequences may include fatalities, injuries, environmental damage (prolonged release or fire), progressive asset damage, and/or deferred or lost production. However, asset damage normally occurs first, with secondary or more consequences affecting people, environment, reputation, etc.

The assessment of likelihood is shown on the horizontal axis with assessment of consequence shown on the vertical axis. Four categories of consequence are considered at PDO: the impact on people, assets, environment, and/or reputation. Plotting the intersection of both likelihood and consequence provides a qualitative assessment of the risk level.

Use of the Risk Assessment Matrix will:

- Enhance appreciation of HSE risk and help in reducing the residual risk to As Low As Reasonably Practicable (ALARP) at all levels in PDO (see Section 4.5.3 regarding ALARP).
- Assist in setting clear risk based strategic goals, objectives, targets, and controls.
- Provide a systematic, structured, and standardized basis for implementation of a risk-based HSE Management System.
- Provide consistency in evaluating and managing risk across all PDO activities, including contractor activities.
4.4.3 Scope of Quantitative Risk Assessments

Quantitative Risk Assessments (QRA) are undertaken for more complex facilities or activities, and/or where required by law. Determining whether a qualitative or quantitative technique is to be used depends on the scope and complexity of the scenario being assessed. However, the application of quantitative methods is considered to be desirable under the following situations:

- When evaluating and comparing risk reduction options and where the relative effectiveness of these options is not obvious.
- When the exposure of the workforce, public or strategic value of the asset is high, and risk reduction measures are to be evaluated.
- When novel technology is involved resulting in a perceived high level of risk for which no historical data is available.
- When a demonstration that risks are being managed to a level which is as low as reasonably practicable (ALARP) is required.
- The application of QRA need not be limited to large, complex and expensive studies, however. It is a technique that can be applied quickly and inexpensively to help structure the solution to problems for which the solution is not intuitively obvious.

Only staff with adequate training and experience should undertake QRA, although it is critical that personnel familiar with the operation or facility are involved in the study. QRA often involves the use of specialized software.

QRA provides a structured approach to assessing risk, whether the risks are human, hardware / software failure, environmental events, and/or combinations of failures and events.

QRA identifies high-risk areas, assists in efficient and effective risk management, and helps demonstrate that risks are being managed to a level deemed ALARP. Refer to SP 1258 – Quantitative Risk Assessment for further details on QRA.

4.5 PROCEDURES – CONTROL

4.5.1 Scope of Controls

The third stage in HEMP, developing fit-for-purpose risk controls, requires use of appropriate risk control identification techniques, such as HAZOP / PR-1696, for example. Application of the technique chosen should cover:

- All activities, products, and/or services controlled by PDO, and those influenced by PDO, such as supplier, contractor, and sub-contractor activities.
- The activities, products, and/or services carried out by all personnel having access to the workplace and facilities at the workplace. Including suppliers, contractors, and/or sub-contractors.
- Routine (frequently performed), non-routine (infrequently performed), and/or emergency operating conditions and activities. Sometimes the categories of normal and abnormal operating conditions are also considered.
- The lifecycle of an asset or activity, from the planning stage, through operation to decommissioning, and disposal and restoration.

Risk controls should include prevention, mitigation, and recovery measures. The following table illustrates the difference among these various types of controls:
<table>
<thead>
<tr>
<th>CONTROLL</th>
<th>USE</th>
<th>DESCRIPTION AND EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PREVENTION MEASURES</strong></td>
<td>To reduce the likelihood / probability of hazards or to prevent or avoid the release of a hazard.</td>
<td>Examples include guards or shields (coatings, inhibitors, shutdowns), separation (time and space), reduction in inventory, control of energy release (lower speeds, safety valves, different fuel sources), and administrative (procedures, warnings, training, drills).</td>
</tr>
</tbody>
</table>
| **MITIGATION MEASURES** | To reduce or limit the number and severity of the consequences arising from a hazardous event or effect. | **Active systems** - Intended to detect and abate incidents, i.e., gas, fire, and smoke alarms, shutdowns, deluge systems.  
**Passive systems** - Intended to guarantee the primary functions, i.e., fire and blast walls, isolation, separation, protective devices, drainage systems.  
**Operational (non-physical) systems** - Intended for emergency management, i.e., contingency plans, procedures, training, drills. |
| **RECOVERY MEASURES** | Includes top events. | All technical, operational, and organizational measures which can:  
- Reduce the likelihood that the first hazardous event or ‘top event’ will escalate or develop into further consequences.  
- Provide life saving capabilities should the ‘top event’ escalate further. |

Development of risk controls should consider the “PDO Hierarchy of Risk Controls” as described below.

PDO Hierarchy of Risk Controls

In all cases, risk controls should be developed and established so that risk reduction achieves a level that is ALARP. The PDO Risk Assessment Matrix is to be used as a standard to identify controls that reduce risk to ALARP. This Matrix for Risk Management is shown below.

![PDO Hierarchy of Risk Controls Diagram](image-url)

Depending on what the threat and/or hazard is, the same control may be used to prevent, mitigate, and/or recover from a threatening and/or hazardous event. For example, all measures ranging from the first steps in mitigation through to reinstatement of the operation assist in preparing for recovery.

An important outcome of HEMP is identifying the HSE risks arising from PDO operations that are classified as “high,” prioritizing these, and identifying the actions that must be taken to manage them. These actions are defined as HSE Critical Activities and are a focus of PDO’s HSE Management System.
4.5.2. Risk Acceptance Criteria

Risk Acceptance Criteria have been established at PDO to provide guidance to the question, “If the risk is determined to be Low, Medium, or High, what should we do with respect to demonstrating ALARP?” For example, SP-1258 – Quantitative Risk Assessment (QRA) refers to risk acceptance criteria. In general, risk acceptance criteria apply the following concept:

- For low risks, there is usually no formal need to demonstrate ALARP; the risks are already low.
- For medium risks, sometimes there is a need to demonstrate ALARP by determining and incorporating risk reduction measures. This can be a leadership decision as to what types of controls are required for the various HSE risks that are faced.
- High risks require some type of immediate risk reduction plan or measures so as to proceed with the work or activity. In some cases if an immediate risk reduction solution cannot be found and applied, the task or activity may not be allowed to proceed.

4.5.3 What is ALARP?

ALARP – As Low As Reasonably Practicable - is often expressed in qualitative or quantitative terms. However, ALARP itself does not prevent accidents; suitable, adequate, effective, and timely implementation of risk controls prevents accidents. Therefore, the following statements are provided as a guide to determining whether a particular risk is being managed to an ALARP level:

- Management ultimately decides whether ALARP is achieved, on a case by case basis, for each particular risk.
- For each particular risk, ALARP can only be determined by comparing a number of risk control options or strategies.
- If risk is not controlled in a manner that meets applicable standards (e.g., Omani Law, industry codes of practice, PDO Specifications, international standards, and/or other stakeholder concerns / expectations), ALARP has not been achieved.
- ALARP has not been achieved if risk can be appreciably reduced further for only a small incremental cost or investment.
- There are several quantitative and qualitative tools that may be used to assist in determining that risks are managed to ALARP levels, e.g. the Risk Assessment Matrix, QRA, HAZID, HAZOP, Task Risk Analysis, Cost Benefit Analysis (CBA), etc.

Part of the ALARP demonstration process will involve assessing and evaluating the magnitude of the risk reduction that can be provided by a proposed option. Along with the benefit, the technical feasibility, cost and effort of the proposed risk reduction option should also be assessed as part of CBA. For more information about ALARP, see GU-655 Demonstrating ALARP.

The quantified risk reduction considered within the scope of a QRA study, for example, should be limited to options that can be reasonably evaluated by QRA. These are broadly inherent safety options, but may also include some engineered and procedural controls. As many of the risk reduction options would involve changes to the process design, facility layout, safeguarding, or operations philosophy, the brainstorming of QRA risk reduction options should involve a multi-disciplinary team. Identified options should be ranked on quantitative risk reduction against cost and effort of implementing. The residual risk or the benefits gained from risk reduction initiatives, once risk reduction initiatives are approved and implemented, should also be determined by the team.

Example of Managing Risk to ALARP

As a guide to deciding whether risk is managed to ALARP, the following statements can be made about the example above:

- Option 1 is not ALARP as the risk is not yet controlled to applicable standards.
- Options 2 and 3 may be ALARP. However, if for only a small incremental investment, the risk level could be further reduced as in Option 4, Option 4 would then be ALARP.
- Options 5 and 6 may not be ALARP as the reduction in risk may not be justified by the additional investments required for control.
4.5.4 Residual Risk

Residual risk is the “remaining” risk after all proposed controls are applied and taking into consideration the quality and effectiveness of the controls in place. The potential difference between inherent and residual risk gives an indication of the quality and effectiveness of the controls put in place. When considering residual risk levels, this should be done in the context of the overall risk profile for the business. In the case of PDO managing major process plants and other process safety issues, major accident hazards are still likely to be a significant contributor to the overall PDO risk profile.

Where the residual risks remain at high levels, PDO senior leadership should consider if and what strategic activities are required to further lower the risk levels during their management review processes. This is applying the concept of continual improvement to the overall HEMP process and the organization’s overall Risk Profile.

The terms ‘risk acceptance’ and ‘risk appetite’ require consideration as well. Risk acceptance refers to a set of criteria defining the limits above which risks cannot be tolerated. Risk appetite refers to the positive benefits of exploiting a business opportunity associated with the risks. These two concepts together should be balanced against one another and against the cost of managing the exposure. Some other key points regarding residual risk with respect to the managing risk process:

- Residual risk, initially, is a prediction by the assessment team of the risk that will remain, assuming the recommended risk control(s) are implemented. At this stage it is not yet tested or proven.
- Risk controls, once their implementation has begun, must be verified in the field at the point of control as to whether the targeted residual risk level has been achieved or not. At this stage, the key question becomes, “Have the implemented risk controls brought the risk down to the predicted level?” This is a key part of risk monitoring.
- Once determined, the original risk assessment documentation has to be reviewed and changed as necessary. For example, if the original determination was that a high risk could be brought down to a low risk, but field verifications and the evidence shows the risk level to be actually a medium residual risk, then the risk register and other associated risk documentation must be changed and updated accordingly.

4.6 PROCEDURES – RECOVER

The fourth and final stage in HEMP is to ensure the necessary steps are planned to be able to recover from the release of a hazard, should the controls that have been put in place fail to prevent its release. Recovery from the consequences of the release of a hazard requires careful planning. Even with a comprehensive range of controls in place to prevent the release of hazards and/or their effects, things can still go wrong.

Should the controls fail to prevent or avoid the release of a hazard then some kind of counter measures are required to limit the number and severity of the consequences of the hazardous event or effect. These counter measures are aimed at mitigating the consequences of the hazard and aid in reinstatement of the normal operation or activity.

Recovery measures can reduce the likelihood or probability that the first hazardous event will develop into further consequences and provide life saving capabilities should the ‘top event’ escalate further. To assist with recovery, it is important that all personnel are fully briefed and drilled as to the response measures planned, including evacuation and restoration procedures. For major incidents, this may include also crisis management and business continuity planning.
4.6.1 Scope of Recovery

Recovery should include:

- All activities, products, and/or services controlled by PDO, and those influenced by PDO, such as supplier, contractor, and sub-contractor activities.

- The activities, products, and/or services carried out by all personnel having access to the workplace and facilities at the workplace including suppliers, contractors, and/or sub-contractors.

- Routine (frequently performed), non-routine (infrequently performed), and/or emergency operating conditions and activities. Sometimes the categories of normal and abnormal operating conditions are also considered.

- The lifecycle of an asset or activity, from the planning stage, through operation to decommissioning, and disposal and restoration.

In developing recovery measures, consider and include both active (e.g., emergency shutdown procedures, automatic blowdown systems, alarms, fire protection) and passive emergency preparedness and response arrangements (e.g., emergency response call out and duty rosters) for both operational and contingency planning (abnormal situations and potential emergencies). Refer to Chapter 5 of this Manual “Planning and Procedures” for more details about emergency preparedness and response.

For effective recovery procedures it is important that each recovery measure be accompanied by formal documentation. For instance, each action that should be taken in the event that a control fails shall be documented. In addition, the persons responsible and/or accountable for establishing, maintaining, implementing, and reviewing each associated procedure shall be defined and competent.

Effective recovery procedures also require testing and review. For instance, all procedures for recovery from high risk and emergency scenarios shall be in place and subject to testing and defined review periods. In between the defined review periods, recovery procedures should be reviewed, and possibly updated, for the following situation:

- An incident has occurred.

- Following analysis of drills and testing.

- Any changes in the operational environment occur.

- There are changes in legal and other requirements and/or industry best practice.

Performance against all recovery procedures should be recorded and formally reviewed periodically. Such performance may be linked to Company, Asset, and/or local goals, objectives, and/or targets. Parties responsible and accountable for implementing recovery procedures shall be competent to do so and clearly understand their roles, responsibilities, and accountabilities.

4.6.2 HEMP Tools - Recovery

Experienced personnel can construct a bow tie diagram as part of a hazard analysis (HAZAN) and use this to consider the chain of events resulting from a top event and the recovery measures required to reduce the probability and effect of each consequence. Knowledge of experienced personnel is invaluable for hazard identification and analysis / assessment, particularly coming from direct feedback from incidents, accidents, near misses, and/or hazards.

Procedures for recovery from high risk and emergency scenarios should be in place and subject to drills, testing, and review. Creating simple checklists and/or Work Instructions, based on procedures, clarify and expedite response in real emergency situations.

All control and recovery procedures should be established, included, and recorded in the HSE Management System, an HSE Case, MOPO, and/or Job Safety Plans with recovery actions that should be taken in the event a control fails being documented.
It is important to establish, manage, maintain, review, and update HEMP-related records to demonstrate traceability and compliance with the entire HEMP process itself, the HSE MS, and/or other requirements. This includes creating, making available, maintaining, and reviewing / updating the documentation for Safety Critical Equipment, including data and drawings that are critical to managing Process Safety / Technical Integrity. The PDO Matrix for Demonstration of Risk Management shown below shall be used as a standard for determining the type of HEMP records required for creating, recording, and retention.

4.7.1 HEMP Tools – Records

The following documents should be kept to describe the hazards and effects identification, analysis, controls results, and their monitoring requirements.

A Hazard and Effects Register demonstrates that all hazards and effects have been identified, are understood, and are being properly controlled. The Register is kept current throughout the life cycle of a project, i.e., from the planning and design stage, through operation, to decommissioning, abandonment, and disposal. The purpose of the Hazards and Effects Register is to present the results of the analysis made of each hazard or effect present in, or resulting from, the facility or operation.

Once the Hazards and Effects Register is completed it is possible to complete a Manual of Permitted Operations (MOPO) which defines:

- The level and number of barriers put in place initially and the recovery measures to be put in place.
- The limit of safe operation if the barriers and/or recovery measures are reduced, removed, bypassed, and/or purposefully defeated.
- The limit of safe operation permitted during periods of escalated risk in likelihood, consequences, or both.
- Which activities may or may not be carried out concurrently, often referred to ‘Simultaneous Operations.’

Hazards and effects information gained from the Hazards and Effects Register and a MOPO is now incorporated into the HSE Case. The HSE Case must demonstrate that:

- All threats, hazards, and effects have been identified.
- The likelihood and consequences of a hazardous event have been assessed.
- Controls to manage potential causes (threat barriers) are in place.
- Recovery / emergency preparedness measures to mitigate potential consequences have been taken.
### 4.8 REFERENCES

The following documents provide further related information on the Hazards and Effects Management Process (HEMP):

| PDO Policies | PL-03 – Risk and Internal Control  
| | PL-04 – Health, Safety, and Environmental Protection | PL 03  
| | PL 04 |  
| PDO Codes of Practice | CP-131 – Risk and Opportunity Management | CP 131 |  
| PDO HSE Procedures | PR-1232 – Design Integrity Review Procedure  
| | PR-1696 – HAZOP Procedure  
| | PR-1971 – HAZID Procedure | PR 1232  
| | PR 1696  
| | PR 1971 |  
| PDO HSE Specifications | SP-1075 – Fire and Explosion Risk Management (FERM)  
| | SP-1258 – Quantitative Risk Assessment (QRA)  
| | SP-2062 – HSE Specification: Specifications for HSE Cases | SP 1075  
| | SP 1258  
| | SP 2062 |  
| PDO HSE Guidelines | GU-195 – Environment Assessment Guideline  
| | GU-230 – Fire and Explosion Risk Management (FERM) Facility Plan Guideline  
| | GU-432 – Road Transport HSE CASE  
| | GU-447 – Integrated Impact Assessment Guidelines  
| | GU-611 – PDO Guide to Engineering Standards and Procedure  
| | GU-655 – Demonstrating ALARP | GU 195  
| | GU 230  
| | GU 432  
| | GU 447  
| | GU 611  
| | GU 648  
| | GU 655 |  
| Other PDO Documents | No direct link exists and/or is required. | -- |  
| | OHSAS 18001:2007  
| | CCPS 2010 |  

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| PDO Policies | PL-03 – Risk and Internal Control  
| | PL-04 – Health, Safety, and Environmental Protection | PL 03  
| | PL 04 |  
| PDO Codes of Practice | CP-131 – Risk and Opportunity Management | CP 131 |  
| PDO HSE Procedures | PR-1232 – Design Integrity Review Procedure  
| | PR-1696 – HAZOP Procedure  
| | PR-1971 – HAZID Procedure | PR 1232  
| | PR 1696  
| | PR 1971 |  
| PDO HSE Specifications | SP-1075 – Fire and Explosion Risk Management (FERM)  
| | SP-1258 – Quantitative Risk Assessment (QRA)  
| | SP-2062 – HSE Specification: Specifications for HSE Cases | SP 1075  
| | SP 1258  
| | SP 2062 |  
| PDO HSE Guidelines | GU-195 – Environment Assessment Guideline  
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| | GU-611 – PDO Guide to Engineering Standards and Procedure  
| | GU-655 – Demonstrating ALARP | GU 195  
| | GU 230  
| | GU 432  
| | GU 447  
| | GU 611  
| | GU 648  
| | GU 655 |  
| Other PDO Documents | No direct link exists and/or is required. | -- |  
| | OHSAS 18001:2007  
| | CCPS 2010 |  

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