

ALARP Demonstration & Closing Remarks

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Presentation Outline

- What does 'Demonstration' mean?
- Key Concepts
- ALARP Demonstration
- Assessment Criteria
- Closing Remarks

What does 'Demonstration' mean?

- Making a demonstration does not mean 'proving beyond reasonable doubt'
- Demonstration is not a mere statement or description or assertion that ALARP has been achieved
- In a Safety Case, MHIs are required to show
 - Through reasoned and supported arguments,
 - That all practical measures that can be **reasonably** implemented have been implemented to reduce the risk
 - For **Safety Critical Events** (SCEs)
- The adopted control measures must be shown to collectively eliminate, or reduce the risk to As Low As Reasonably Practicable (**ALARP**) levels
- The approach employed in providing evidence of ALARP demonstration is at the MHI's discretion

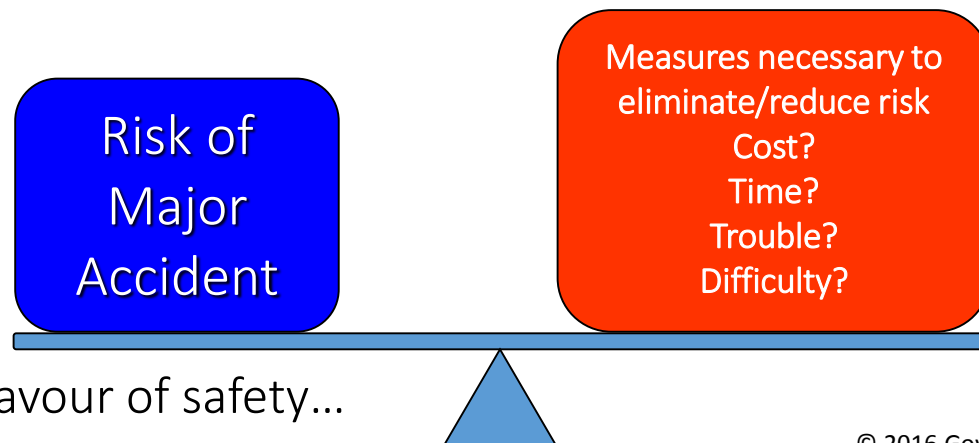
Key Concepts

Reasonable practicability

- Practicability: Can a control measure be implemented?
- Reasonable: Sacrifice to implement a control measure involving the test of 'gross disproportion'

Gross disproportion

- A point where any incremental sacrifice to implement more control measures does not derive additional benefit over the sacrifice
- At this point, risk reduction is considered ALARP



A balancing act in favour of safety...

Key Concepts

Recommended

Inherently safer design

- Elimination of risk by removing the hazard;
- Substitution of a hazard with a less hazardous one;
- Prevention of potential events;
- Separation of people from the consequences of potential events;
- Control of the magnitude and frequency of an event;
- Mitigation of the impact of an event on people; and
- Emergency response and contingency planning.

Good practices & engineering principles

- Well-defined and established standards or codes of practice, including ‘learnings’
- May change over time due to technological advancement or increased knowledge and understanding.

Key Concepts

Less Widely Utilised

Cost Benefit Analyses (CBAs)

- The numerical assessment of the costs of implementing a design change or modification and the likely reduction in risk that this would be expected to achieve.
- CBA may be used in cases where it is difficult to determine whether the cost is justified after completing risk assessments of sufficient rigour.
- **MHIs shall justify the assumptions used in the assessment.**

Caution!

Reverse ALARP

Using QRA or CBA to justify a higher risk option for new projects or removal of an existing control measure in existing facilities.

ALARP Demonstration

Safety Cases are expected to:	So, ask yourselves...	What to do...
Present options	What more can MHIs do to reduce the risks?	<ul style="list-style-type: none"> • Look systematically at each SCE • Draw up, in a proportionate way, a list of control measures that have been implemented and which could be implemented to further reduce the risks of SCE
<p>Make reasoned arguments</p> <p>Explain why the risk reduction measures put in place reduce risks to ALARP</p>	What further risk reduction measures are “reasonably practicable”?	<ul style="list-style-type: none"> • Qualitative or quantitative • Sacrifice grossly disproportionate to benefits? • If the control measure is “reasonably practicable”, based on sound logical considerations, implement that measure.
Conclude	What has been and will be implemented?	<ul style="list-style-type: none"> • What has been implemented • Action plan

ALARP Demonstration – Assessment Criteria

Technical Criterion	
Risk Assessment and Risk Reduction Measures	
<p>7.1 The safety case shall clearly describe how MHIs use risk assessment to help make decisions about the measures necessary to prevent major accidents or to mitigate their consequences.</p>	<p>Predictive → Technical aspects → ALARP demonstration</p>
Demonstration of ALARP	
<p>7.2 The safety case shall show the approaches or methodologies used to support the MHIs' evidences and justifications for ALARP demonstration.</p>	<p>Underlying rationale? Decisions made by appropriately qualified and experienced technical personnel?</p>

ALARP Demonstration – Assessment Criteria

Technical Criterion	
Demonstration of ALARP	
7.3.1 What more can MHIs do to reduce the risks from SCEs?	<p>Systematic review of control measures applicable to all SCEs?</p> <p>Training and procedures should not be sole defence against human failure, but an integral part of a broader range of measures to reduce the potential for human failure.</p>
7.3.2 What further risk reduction measures are “reasonable practicable”?	<p>Assess control measures applicable to all SCEs.</p> <p>Comparison of the sacrifice and benefits, and a conclusion whether the sacrifice is <u>grossly disproportionate</u> to the benefits.</p> <p>Qualitative argument, else quantitative (e.g. Cost-Benefit Analysis).</p> <p>If good practice and sound engineering principles are used as sole justification of ALARP:</p> <ol style="list-style-type: none"> i. good practice and sound engineering principles are relevant to SCEs; ii. adopted standards are up-to-date and relevant; iii. where a standard allows for more than one option for conformity, the chosen option makes the risks ALARP; and iv. good practice and sound engineering principles reduce the risk to an acceptable level.

ALARP Demonstration

- Systematic rationale and explanation in Safety Cases
- Show in your Safety Case that risk reduction measures are in place
- Implement RRM's on-site
- Consider qualitative approaches first, then quantitative
 - Cost-Benefit Analysis (CBA) could be used to support some ALARP demonstrations
- Reverse ALARP is not recommended

ALARP Demonstration

Useful References

- Guidance on ALARP Decisions in COMAH, UK HSE
- UK HSE's Reducing Risks Protecting People (R2P2), UK HSE
- UK HSE's principles for Cost Benefit Analysis (CBA) in support of ALARP decisions, UK HSE
- NOPSEMA Guidance Note ALARP, NOPSEMA
- Commission for Energy Regulation ALARP Demonstration Guidance Document
- The UK offshore oil and gas industry *guidance on risk-related decision making*, Oil & Gas UK, formerly UKOOA, 2014

Closing Remarks

Date	Oct – Dec	By Dec	Sep
	2016		2017
Activity	<p style="text-align: center;">MHI to submit application and assessment forms, when notified by MHD</p> <p style="text-align: center;">(After enactment of WSH (MHI) Regs)</p>	<p style="text-align: center;">Confirmation of MHI status</p> <p style="text-align: center;"><u>MHIs</u></p> <p style="text-align: center;">Notified of Safety Case submission date & provisional MHI certificate details</p>	<p style="text-align: center;">WSH (MHI) Regulations takes effect</p> <p style="text-align: center;">Provisional MHI certificate to take effect, replacing current Factory certificate</p>
Action via	Email	Letter	-

Speedy responses most appreciated!

Closing Remarks



- Refer to MHD's website: <http://www.mom.gov.sg/workplace-safety-and-health/major-hazard-installations>
 - ✓ List of recognised Safety Case Training Providers for SC Practitioners' Course
 - ✓ Curriculum Development Advisory (CDA)
 - ✓ SC Technical Guide & Assessment Guide
- [Contact MHD@mom.gov.sg](mailto:MHD@mom.gov.sg)

Closing Remarks

- Appoint Safety Case Lead (SCL) and SC teams
- Safety Case capability building for SCL & SC teams
- Baseline assessment of MHI against SC Technical Guide & Assessment Guide
- Be a savvy customer!

- Safety Case Clinics for Phase 1 MHIs, followed by MHIs in later phases

- Early engagement with MHD much preferred
- Do work with MHD closely
- Any queries? Email contact_MHD@mom.gov.sg

Thank You!