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ALARP: CONCEPTS AND TECHNIQUES TO BUILD A SAFETY CASE

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ABSTRACT

This paper provides guidelines to building a safety case by means of demonstrating that the risks of major accident such as an emission, fire, explosion, or structural failure of hydrocarbon (oil & gas) processing infrastructure, resulting from uncontrolled developments during petroleum exploration and production activities that could cause immediate or eventual harm to human health, or to the environment are known and controlled to a limit that is as low as reasonably practicable (ALARP). Demonstrating ALARP requires designing and building oil and gas facilities for safety and integrity. The concepts and techniques introduced in this paper may benefit managers and professional consultants who oversee the management of asset integrity, process safety, and guide the efforts directed towards building or validating a safety case.

Keywords: safety case, ALARP, asset integrity, process safety, safety critical elements (SCEs), technical integrity.

INTRODUCTION

Oil and gas activities such as drilling, explorations, production, and processing operations imply major hazards with potential to seriously harm people, the environment, and properties. To prevent these hazards or mitigate their impacts, if occurred, governmental authorities have decided to enforce regulations that stipulate that the operator or owner of every offshore installation should be required to prepare a safety case and submit it to the regulator for acceptance. This safety case, which is a structured argument prepared by an operator or owner to convince a regulator that the operational risks at a given facility are known and managed to a level that is ALARP, is a precondition that must be met by the operator prior obtaining a license to operate. This paper will introduce one of the regulations that has spread over the world, and provide guidance to the design integrity and process safety efforts to satisfy the requirements of this regulation.

UK SAFETY CASE REGULATIONS

The UK Health and Safety Executive (HSE) has released the “Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015 (SCR 2015), which has come into force on 19 July 2015 and apply to oil and gas operations in external waters, that is, the territorial sea adjacent to Great Britain and any designated area within the United Kingdom continental shelf (UKCS)” (Health and Safety Executive (HSE), 2015). This regulation was mimicked by many regulators around the world, forcing the operators to adopt ALARP concept and techniques as one of the most effective means to meet the requirements of this regulation.

OVERVIEW OF ALARP PRINCIPLE

Figure 1 illustrates the ALARP principle. The triangle denotes an increasing level of cumulative risk that a person, or population are exposed to from a low risk situation, represented by green at the base of the triangle, to a high risk, represented by red at the top of the triangle. Figure 1 shows the Upper Tolerability Limit, above which risks are intolerable, but might be permitted under specific circumstances and after securing the required state of safety through sufficient precautions. Below the Upper Tolerability Limit, the risk is only tolerable if it is ALARP (Commission of Energy Regulation, 2013).

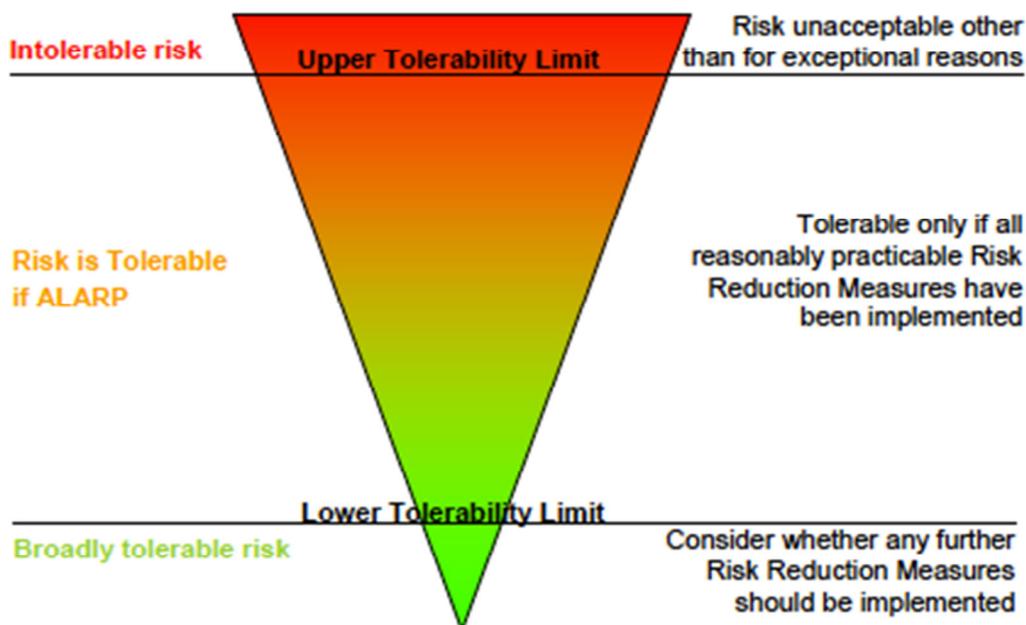


Fig. 1 - Schematic Diagram Showing ALARP Concept - as Illustrated by CER

For a risk to be ALARP, it must be possible to determine that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. (Does et al., 2015).

CONCEPTS, TECHNIQUES AND FURTHER WORK

The full-paper of this abstract will explain the process of developing a safety case based on ALARP concepts and associated techniques, including hazard identification, risk reduction measures in design, construction, and operation phases as well as methods to establish technical integrity framework to demonstrate ALARP.

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