

Title	OTH 94-460 Topside Emergency Shutdown Valve (ESV) Survivability
Publisher/Author	HSE
Publication Date	1996
Executive Summary	<p>This study, carried out in response to Cullen recommendations 48, provides an overview of the range of approaches currently being adopted within the united kingdom continental shelf (UKCS) for the protection of pipeline emergency shutdown valves (BSVS) from severe accident conditions. Its findings are also of relevance to other ESV's in use offshore.</p> <p>The study is based on the analysis of a representative sample of UKCS ESVs. The findings have been used to determine typical and best current practice in this area, and to highlight the main strengths and weaknesses in these approaches.</p> <p>The main findings are that:</p> <ul style="list-style-type: none"> • Current ESV protection arrangements are generally well specified in terms of fire and blast hazards, but impact hazards and other secondary hazards such as vibration and jet erosion are less well recognised or addressed • All the approaches looked at took a holistic view of the ESV, its associated control systems and the riser, ensuring the overall integrity of the pipeline containment envelope. • The response to Statutory Instrument SI 1029 tended towards the use of "worst case" hazards sometimes resulting in the protection being "over specified" • More recent approaches have used an installation specific assessment of the likely hazard scenarios resulting in a more "fit for purpose" specification of the ESV and its protection. • Proposed future approaches are likely to rely on a more risk based approach to ESV protection, taking into account the reliability of the ESV, the degree of protection for the ESV vs. that for the installation as a whole and the escape, evacuation and rescue arrangements. • The principles of inherent safety are also likely to be favoured in the future, by trying to reduce the inventory in the riser or pipeline, for example by the use of sub-sea isolation systems, and by locating the ESV and riser away from the effects of hazards. • The ability to test or otherwise demonstrate the adequacy of any protection or the ESV is an area that still needs development, both in terms of recognised test standards and recognised analysis codes and calculation methods. <p>The study concludes that:</p> <ul style="list-style-type: none"> • Operators have carried out studies to specify the protection for ESVs from severe accident conditions. A number of approaches have been taken and these are summarised in this report. • There are a number of general and specific shortcomings in these approaches and these are highlighted to show where improvements could be sought in the future. <p>The report also puts forward a systematic method for addressing ESV vulnerability which could form the basis of a more consistent, industry wide, approach to ESV specification.</p>

Table of Contents	1. Introduction.....	v
	2. Study objectives	3
	3. Scope of study	5
	4. The approach taken	7
	4.1 overall approach.....	7
	4.2 industry participation	7
	4.3 approach to ESV selection.....	7
	4.4 approach to the, review and assessment of ESV protection arrangements	8
	5. Findings of the review and assessment.....	11
	5.1 survey of current ESV protection arrangements.....	11
	5.2 review and assessment of current ESV protection arrangements	12
	5.3 review of incidents involving ESV's	16
	5.4 review of operating experience with ESV's and their protection	17
	5.5 typical and current best practice	17
	5.6 other issues raised	19
	6. Conclusions.....	21
	6.1 the early cases of ESV protection	21
	6.2 more recent approaches to ESV protection.....	21
	6.3 future improvements	22
	References.....	23
	Acknowledgement	25
Table 1 - summary of means of protection provided for ESV's	27	
Table 2 - summary of the 8 "selected" ESV arrangements and their means of protection	29	
Appendix 1 - Form A	31	
Appendix 2 - Form B	37	
Appendix 3 - Form C	41	
Appendix 4 - Form D	45	
Appendix 5 - flowchart 1 approach checklist for ESV survivability	59	