

## Table of Case Studies and Technical Measures

The table below illustrates the technical measures which failed or were not adequately implemented in each of the incidents, and can therefore be used to identify good examples of the importance of particular technical measures.

Incident	Active/ passive fire protection	Alarms/ trips/ interlocks	Control room design	Control systems	Corrosion selection of materials	Design codes - buildings/ structures	Design codes - jetties	Design codes - pipework	Design codes - plant	Drum/ cylinder handling	Earthing	Emergency response/ spill control	Explosion relief	Hazardous area classification/ flameproofing	Inerting	Inspection/ NDT	Isolation	Leak/ gas detection	Lifting procedures	Maintenance procedures	Operating procedures	Permit to work	Plant layout	Plant modification/ change procedures	Quench systems	Raw materials control/ sampling	Reaction/ product testing	Reliability of utilities	Relief systems/ vent systems	Secondary containment	Segregation of hazardous materials	Site security	Roadways/ site traffic control/ immobilisation	Training	Warning signs			
Abbeystead explosion (23/5/84)									X								X				X													X				
Albright & Wilson (3/10/96)																									X													
Allied Colloids Ltd (21/7/92)	X											X													X				X									
Associated Octel (1/2/94)					X			X									X			X										X	X							
B&R Hauliers (25/9/82)	X																								X					X					X			
BASF warehouse fire (9/10/95)	X											X											X															
Beek (7/11/75)									X			X																										
Bhopal - Union Carbide (3/12/84)									X			X								X							X											
BP Oil - Dalmeny Refinery (11/6/87)														X			X			X												X			X			
BP Oil (Grangemouth) Refinery (13/3/87)								X									X			X																		
BP Oil (Grangemouth) Refinery (22/3/87)		X	X														X			X	X							X										
BP Oil West Glamorgan (17/1/81)	X								X							X																						
Chemstar Ltd explosion/fire (6/9/81)																											X	X								X		
Chicago Gas Release (26/4/74)								X				X																										
Dow Chemical factory explosion (27/6/76)																							X				X											
Explosion caused by explosion suppression system									X				X											X														
Feyzin (4/1/66)								X	X			X										X																
Flixborough (Nypro UK) explosion (1/6/74)			X					X							X					X	X		X															
Havkong incident (23/1/93)			X									X									X																	
Hickson & Welch Ltd fire (22/9/92)				X										X						X		X	X		X	X												
International Biosynthetics Ltd (7/12/91)				X																						X		X										
Marathon Petroleum Refinery (30/10/87)																			X																			
Mexico City - PEMEX LPG terminal (19/11/84)	X											X					X	X					X															
Mill Woods Pipeline failure (March 1976)												X																										
Pasadena - Phillips 66 (23/10/89)	X											X						X		X		X	X														X	
Polymerisation runaway reaction (May 1992)									X			X				X								X		X	X											
Railcar shunt causes propylene release																X					X													X				
Rupture of liquid nitrogen storage tank (28/8/92)																					X							X									X	
San Francisco natural gas pipeline (25/8/81)												X					X		X		X																	
Seveso - Icmesa Chemical Company (9/7/76)		X	X						X			X									X					X	X	X										
Shell Stanlow (20/3/90)			X																						X	X												
Sparking during liquid transfer											X																											
Staveley Chemicals (27/6/82)										X																												
Texaco Refinery (24/7/94)			X	X								X								X				X														
Universal Freight warehouse (13/2/82)												X														X												
Warehouse fire						X						X																				X						
-	6	2	4	5	1	1	1	5	8	1	1	16	1	2	1	2	7	3	1	10	8	3	5	6	2	5	8	1	7	4	3	2	1	4	2			