Major Process Safety Incident vs Root Cause Map

(Quick Reference Guide)

IChemE Safety & Loss Prevention Special Interest Group

Sector		Date	Event	Country	Type	Fatalities	Injuries	Abnormal Operations	Escalation Potential	Earthquake	Tsunami	Flood	Hurricane	Extreme Cold or Ice	Process Design	Hazard Identification	Equipment/Piping Design	Matterials of Construction	Instrumentation	Safety Instrumented Systems	Protective Systems	Plant Layout	Occupied Buildings	Hazard Awareness	Process Control	Process Monitoring	Alarm Management	Creeping Change	Risk Assessment	Work Planning	Control of Work	Energy Isolation	Housekeeping	Material Degradation	Inspection	Preventative Maintenance	Human Factors	Role Clarity	Personal Protective Equipment	Communication	Procedures	Training	Management of Change	Emergency Preparedness	Failure to Learn	Production over Safety	Process Safety Management	Design Standards	Land Use Planning	Regulatory Compliance Audits	Investigation Reports
								Context		Natural Hazards					Design Factors									Operations Factors					Maintenance Factors								Personal			Competency			Culture					Regulator			Links
Oil & Gas	Upstream	06-Jul-88	Piper Alpha	UK	Explosion	167	?										X				X	X							X		X	X					X			X	X	X	X	X			X				Click
		27-Jul-05	Mumbai High North	India	Explosion	22	?								X							X		X					X								X	X		X	X	X								X	
		20-Apr-10	Macondo	USA	Explosion	11	17	X							X	X	X		X	X						X			X							X	X	X		X	X	X		X				X	X		X	Click
		11-Feb-15	Camarupim	Brazil	Explosion	9	26	X							X	X			X			X		X					X		X						X	X		X	X	X	X	X		X	X				X	
	LNG	19-Jan-04	Skikda	Algeria	Explosion	26	74		X						X			?	X			X	X													X	X					X					X	X	X		
	GPP	25-Sep-98	Longford	Australia	Fire	2	8	X								X				X				X		X	X							X			X			X	X	X		X			X			X	
	Downstream	04-Jan-66	Feyzin	France	BLEVE	18	84								X		X							X																	X	X		X				X				
		23-Jul-84	Romeoville	USA	Explosion	17	22											X																X																		
		22-Mar-87	Grangemouth	UK	Explosion	1	0	X	X											X											X										X	X	X		X							Click
		05-May-88	Norco	USA	Explosion	8	18															X	X											X									X							X		
		24-Jul-94	Milford Haven	UK	Explosion	0	26	X	X								X		X							X	X		X		X			X	X	X	X			X		X	X	X			X				Click
		17-Aug-99	Izmit	Turkey	Fire	0	0		X	X					X														X					X								X		X							X	
		16-Apr-01	Humber	UK	Explosion	0	5		X							X	X																	X	X	X				X			X				X				Click
		23-Mar-05	Texas City	USA	Explosion	15	180	X							X	X			X				X			X		X	X		X			X		X	X	X		X	X	X	X		X	X	X			X	Click
		05-Nov-05	Delaware City	USA	Asphyxiation	2	0																	X							X										X	X										Click
		16-Feb-07	McKee	USA	Fire	0	4		X					X	X	X				X		X							X							X							X						X			Click
		02-Apr-10	Anacortes	USA	Explosion	7	0	X								X	X	X										X						X														X			Click
		06-Aug-12	Richmond	USA	Fire	0	26											X											X					X	X										X		X	X	X	X		Click
		18-Feb-15	Torrance	USA	Explosion	0	4	X	X							X			X																					X		X		X			X				Click
	Ship	24-Mar-89	Valdez	USA	Pollution	0	0		X					X			X		X							X											X			X	X	X		X			X			X	
	Rail	06-Jul-13	Lac Mégantic	Canada	Fire	47	?																														X														
	Terminal	19-Nov-84	San Juan Ixhuatepec	Mexico	BLEVE	542	4248												X	X		X																				X	X	X					X	X		
		11-Dec-05	Buncefield	UK	Explosion	0	43		X						X	X			X	X		X			X	X		X	X							X	X			X	X	X	X	X		X	X		X		
		23-Oct-09	Bayamón	Puerto Rico	Explosion	0	?								X	X				X																				X	X		X	X							Click
Petrohemical	Manufacture	01-Jun-74	Flixborough	UK	Explosion	28	104	X	X													X	X	X					X					X	X		X			X		X	X	X		X		X			
		23-Oct-89	Pasadena	USA	Explosion	23	314	X									X		X			X									X	X				X				X	X	X	X	X	X		X				
		21-Sep-92	Castleford	UK	Fire	5	201	X														X	X	X					X		X						X					X	X	X	X		X				Click
		01-Feb-94	Ellesmere Port	UK	Fire	0	18										X																		X					X			X								Click
		27-Mar-98	Taft	USA	Asphyxiation	1	1									X								X							X									X											Click
		13-Jun-13	Geismar	USA	BLEVE	2	167	X								X								X																X	X		X		X		X				Click
		03-Jun-14	Moerdijk	Netherlands	Explosion	0	2	X								X			X	X				X	X											X				X	X	X	X	X	X		X			X	
		31-Aug-17	Crosby	USA	Fire	0	21					X	X			X																												X				X	X		Click
Agrochemical	Manuf.	10-Jul-76	Seveso	Italy	Toxic Release	0	462	X							X	X			X	X				X													X			X	X		X	X			X	X		
		03-Dec-84	Bhopal	India	Toxic Release	2153	>200,000	X							X	X		X						X					X						X	X				X	X	X	X		X		X		X		
		21-Sep-01	Toulouse	France	Explosion	30	2442		X							X								X					X				X								X		X	X		X		X			
		15-Nov-14	La Porte	USA	Toxic Release	4	0								X	X															X										X				X						Click
	Store	17-Apr-13	West	USA	Explosion	15	> 160		X							X								X					X													X		X	X					X		Click
Phar	Man	29-Jan-03	Kinston	USA	Explosion	6	38									X								X									X							X			X				X				Click
		28-Apr-08	Cork	Ireland	Runaway	1	1								X	X	X												X								X				X	X		X				X			
Power Gen	Nuclear	28-Mar-79	Three Mile Island	USA	Near Miss	0	0		X						X	X			X			X					X										X			X	X	X		X						X	
		26-Apr-86	Chernobyl	Russia	Explosion	> 30	~ 7000	X	X						X	X	X			X				X													X			X	X	X	X	X	X	X	X			X	
		11-Mar-11	Fukushima Daiichi	Japan	Explosion	0	13		X	X	X					X			X			X							X												X	X		X			X			X	
	Coal	08-Apr-99	Gannon	USA	Explosion	3	48																								X										X										
		10-Nov-07	Dallman	USA	Explosion	0	0	X	X											X			X		?	?										X															
H_2O		23-May-84	Abbeystead	UK	Explosion	16	28	X							X	X			X					X																X		X									Click
		06-Jul-88	Lowermoor	UK	Pollution	0	?									X						X							X								X			X	X	X		X			X				
Food		03-Sep-91	Hamlet	USA	Fire	25	54									X			X	X		X															X			X	X	X		X			X			X	
		07-Feb-08	Port Wentworth	USA	Explosion	14	36								X	X								X					X				X				X			X	X	X	X	X	X		X			X	Click

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