

CONTENTS

GENERAL INTRODUCTION

Αp	political approach to major technological risk	1
1. 2.	A new field of enquiry into the very foundations of our industrial civilisation Priorities for our examination	3 7
3. 4. 5.	collective choice Itinerary Layout of the thesis	10 12 15
Re	ferences	17
	PART ONE	
A (Change in the nature and the scale of major risk	25 18
Ch	apter One : A series of grave warnings	21
•	I Saturday, June 1, 1974 : Flixborough	21
1.	A factory wrecked, 2450 houses damaged	21
2.	The analyses of the commission of enquiry 1 st The company and its factory 2 nd The sequence of accidents (January to June 1974) 3 rd Beyondd the actual event : An unpleeasant context from the point of view of safety	25 25 26 31
3.	Beyond the enquiry commission's analyses, more general socio-economic investigations 1 st The non-existence of public control 2 nd The economic difficulties of the industrial group	32 32
4.	Conclusion : The warning shot of Flixborough References	33 34

•	II	Saturday, July 10, 1976 : Seveso	35
1.	Dioxin	, a formidable poison	35
	1 st	Sharp toxicity, astonishing sstability	38
	2 nd	Probably very grave but still little know deferred effects	38
	3 rd	A substance difficult to eliminate as the precedents have shown	40
2.	The fa	actory at Meda : serious deficiencies	42
	1 st	The operationas seen by the Hoffmann-La Roche group	42
	2 nd	Some radical criticism from Italian disparagers of Hoffmann-La Roche	43
	3 rd	Observations by the commission of enquiry	44
	4°	The dificiency of the authorities in matters of preventive control	47
3	The ca	alendar of impotence	40
0.	1 st	July 10 to 24 : The dioxin takes over ; the manufaturer	
		is silent, bureaucracy reasserts itself	49
	2 nd	July 25 to August 30 : some measures against the dioxin and	
	ord	much effort to save the existing installations	54
	3	September – October : searching for a politically economically and	63
	4°	1976-1980 The burden of Seveso. Those in charge chooose to deal	03
	-	with the discomfort of the people rather than with the danger. The people	
		demanded compensation, silence and oblivion	68
1	Balan	na Shaat	71
ч.	1 st	Health	71
	2 nd	Territory	73
	3 rd	Economy	73
_	ő		
5.	Seves	o : To ovoid oblivion	73
	Refere	ences	74
•	III	Thursday, March 16, 1978 : the Amoco-Cadiz	77
1.	The st	randing	77
	1 st	The facts as they seem to have occurred out at seau	77
	2 nd	Tje facts as they seem to have been perceived ont land	81
	3 rd	The ompression of events received by CROSSMA (Ministry of Transports	84
2.	Search	for explanations	84
	1 st	Search for explanation of events at sea	85
	2"	Search for explanations or the part the authorities concerned did play or could have played	85
3.	Polluti	on	88
4	The h		00
4.			90
	ond	The explication of the Delmer plan	90
	2 3 rd	Critical obsestivations in the parliamentary reports	93
5	The h	alance-sheet of the black tide	Q <u>/</u>
0.	1 st	The ecological impact	94 Q4
	2 nd	The effects on human health	97
	.3 rd	The economic consequences	97
	4°	The financial aspect : Compensation	90
	5°	Legal action	99
6.	Conclu	usion : The absence of a system of protection	100

	 1st The mentality of seafarin people 2nd The irresponsible use of the maritime environment 3° The administrative insufficiency of government actions at sea 4° The laxity of surveillance measures on shipping and the 	100 100 100
	 deficiencies of means of intervention 5° A general situation that could only led to deadlock 	101 102
	References	103
•	IV Wednesday, March 28, 1979 : The nuclear accident at Three Mile Island	105
1.	Three Mile Island : a nuclear centre, an American environment1stTechnical characteristics2ndInstitutional date3°The overall situation in March 1979	105 102 108 109
2.	Five days of technical uncertainty, political confusion and social disquiet 1 st Technical uncertainties 2 nd Political confusion and social disquiet	109 109 115
3.	Somes lessons to be learned from T.M.I. 1 st Technical lessons 2 nd Lessons on the capacity for social control of the event	121 123 124
4.	Balance-Sheet	124
5.	Conclusion	126
	References	126
•	V Saturday, November 10, 1979 : Toronto	129
1.	The accident	129
2.	The organisation of rescue and safety for the population1stThe uncertainty about the contents of the rail carriages2ndThe response in the face of the danger : six successive evacuations3°The culmination point : 240 000 people evacuated, West Toronto put on alert4°Progressive control of the situation : return in 3 phases	130 130 130 133 133
3.	Balance-Sheet	135
4.	Conclusion	135
	References	135
•	Conclusion for five accidents : 28 dead and very serious questions remain	136
Cha	apter Two : Radically new threats	138
•	I <u>The disasters of the industrial era : $XVIII^{e} - XX^{e}$ siècles</u>	138
1.	The general context of safety for the populations in countries undergoing the process of industrialisation : XVII ^e and XIX ^e century 1 st Great scourges which still exiist in Europe	139 139

	2 nd	Safety in everyday life	140
2.	Disast	ers of which the nature is not new	140
	1 st	The great fires in towns	140
	2 nd	The great fires in buildings	142
	3°	The great maritime disasters	145
3.	The ne	ew great risks of the industrial era	147
	1 st	Mining disasters	147
	2 nd	Railway disassters	154
	3°	Gunpowder and ammunition explosions	157
	4°	Factory and installatioin explosions	157
	5°	Great dam breaks	158
	6°	Air disasters	159
	7°	Collapse of large structures	161
	8°	Intoxication and poisoning	161
	Refere	ences	162
•	II	Disasters in large scale industry : the post-war period	164
1.	The	safety context in industrial countries since the War	164
	1 st	Great natural risks	164
	2 nd	Risks connected with land occupancy	165
	3°	Everyday safety	166
	4°	The very great risks surrounding the safety problem	167
2.	Disast	ers known from the past	167
	1 st	Fire	167
	2 nd	Shipping	167
	3°	Mining	167
	4°	Railways	168
	5°	Explosions	168
	6°	Dam burssts	169
3.	Big ac	cidents connected with newly adopted technologies	170
	1 st	Fires in buildings incorporatiing highly inflammable materials	170
	2 nd	Risks presented by highrise buildings	172
	3°	Aircraft accidents	173
	4°	Accidents on oil plarforms	174
4.	Disast	ers linked with large scale industries	174
	1 st	Fires and gas explosions in fixed installations	174
	2 ^{na}	Dispersion of toxic and highly toxic products	180
	3°	Transport accidents	181
Re	ference	S	221

•	III	The threats presented by complex technological systems	
		twenty first century	187
1.	Beyon	d past events : Menaces to be studied	187
2.	Vast fie	elds of study to be covered	190
	1 st	Threats related to energy	190
	2 nd	Threats linked with the chemical industry	199

	3°	Threats linked with the biological sciences and genetic engineering	204
3.	Some r	easons for the present danger	207
	1 st	The scale of operations	207
	2 nd	The nature of products stored	207
	3°	Concentration of activites	207
	4°	Risks caused by malevolence, sabotage and organised attack	215
4.	Techno	logy in its social and natural contexts	215
	1 st	A universe in crisis	215
	2 ^{na}	High risk technology and industry in a world pregnant	
		with menaces and disruptions	216
Re	eference	es	217
•	III	Despite an appearance of greater safety menaces	
		of quite different seriousness	222

PART TWO

THE MANAGEMENT OF MAJOR TECHNOLOGICAL RISK

269

Cha	apter Three : Means and tools of management	227
•	I <u>A panoply of means</u>	227
1.	Means for the prevention of industrial risk1st1st2nd2nd3stThe case of Great Britain3stThe case of Italy	228 228 240 245
2.	The battle against disasters1stHistory2ndThe Civil Safety Directorate and the battle plans	247 247 248
3.	The compensation of victims1°The commercial approach : insurance2 nd New compensation mechanisms : compensation funds3°Public aid ; the responsability of government4°Private bodies of general interest	250 250 253 256 261
Ref	ferences	262
•	II <u>The utilisation of science and spotting techniques for safety</u>	266
1.	Risk studies organised in an overall approach1°Identification2 nd The Assessment3°Evaluation	266 267 270 270

2.	The urilisation of science in the civilian nuclear field :	278
	1 ° Knowledge and a priori prevention	278
	2 nd the determinist approach to safety : the principle of	
	barriers and « defence in depth »"	279
	 4° The connection between the determinist and the probability 	201
	approach to safety	282
3.	Advances and delays in the non-nuclear fields	284
	1 ° The safety of systems in certain activities of the aeronautics	201
	2 nd Safety studies and classifield installations	204 287
		201
4.	A completely new field for application of safety studies :	200
	Large industrial concentrations	200
Ref	ferences	289
•	<u>Conclusion: An arsenal of means for the prevention and the</u> reparation of accidents	294
	reparation of accidents	204
Cha	apter four : Deficiencies and limitations of major risk management	295
•	I <u>Multiple insufficiencies</u>	
1.	Insufficiencies in the means of prevention	295
	1 ° The prevention of black tides : still too limited means of intervention	296
	2 nd The follow-up on classified installation : difficulties	297
	3° The safety of nuclear centres : questions	298
2.	Insufficiencies in the means of defence	300
2	Insufficiencies in the means of reportion	204
3.	1° Limits of the financial capacities of the operators and their covers	301 301
	2^{nd} Limits of compensation funds	301
•	II <u>Very serious and even absolute limitations</u>	305
1.	The serious limits of prevention	305
	1 ° Limits to the prevention of black tides	305
	2 nd Limits to the prevention of large industrial disasters	306
	3° Limits in matters of nuclear safety	308
2.	Quasi-absolute obstacle in the battle against disaster	
		311
3.	Absolute obstacle to reparation	311 312
3.	Absolute obstacle to reparation	311 312
3. Ref	Absolute obstacle to reparation	311 312 313

PART THREE

THE SOCIAL REGULATION OF MAJOR RISK

		379	
Ch	Chapter Five : Operators, authorities, citizens facing major risks		
•	I <u>The operator : prime responsibility for the control of major risk</u>	320	
1.	A host of classical failures	320	
•••	1° The general mental attrude : putting the extreme risk out of mind	320	
	2 nd An approach to insufficiently integrated safety systems	322	
	3° Preceding events – the return of experience	324	
	4° The problem of modifications in technological processes or the life of systems	329	
	5° When safety gives way to the requirements of production or to safeguarding investment	329	
	6° Infringements	330	
	7° Faced with danger or disaster : the behaviour of the operator	332	
	8° The economic problem	335	
	9° The attitude of industrialists faced with major risk	336	
2.	The problem of the human operator	338	
	1 ° « Human error » : simplistic dodging of the real problem	338	
	2 nd Man in accident situations : the limits of adaptation	343	
	3° The piloting of systems	345	
	4° The operator placed in networks of a social nature	348	
Re	eferences	353	
•	II <u>The public authorities</u>	356	
1.	productive activity and safety control : an order of rank seldom denied	356	
	1° A series of cases	356	
	2 nd Key arrangements	359	
	3° The problem of independence of safety authorities	361	
2.	Maintaining public peace	364	
Re	eferences	369	
•	III <u>The citizen</u>	371	
1.	Ignorance	371	
2	Accentance and impotence	274	
۷.		371	
	1 Passivity in general	371	
	 Passivity : alleration beloreration Passivity (as a psychological and political mechanism) « after the event » 	373	
3.	Discussion and rejection	374	
Re	eferences	380	
•	Conclusion · Major risk outside the actors' frame		
	of reference	382	
Ch	hapter six : Social situations to be understood and mastered	385	
•	I Very complex networks of agents	385	

1.	The work tool introduced into the networks	385
2.	Integrated production in dependent entities	386
3.	A multiplicity of agents around the same probleme	387
•	II <u>Complex dynamics</u>	390
1.	Conflicting Interests	390
2.	Contradictory references for action	390
3.	Multishaped conditions	391
4.	The functioning of networks in a disaster situation1°General model of network of intervening parties2 nd The network involved in the Ekofisk acccident3°The network involved in the TMI accident4°The need for anticipation in setting up the networks	393 394 394 395 398
Re	ferences	398
•	Conclusion : Situations which further compleate the task but give no reason to despair of the usefulness of analysis and action	402

PART FOUR

POLICY

483

Ch	Chapter Seven : When politics discard the question of major risk		405
•	Ι	Defending progress : getting projects accepted	406
1.	The arg 1 ° 2 nd	gument for necessity and competence The fantasstic leap forward achieved over three centuries thanks to industry The central position of the scientist and the engineer in these achievements	406 406 407
2.	The es the pro 1 ° 2 nd 3°	tablishment of rational options determined by experts: blem of acceptability Getting projects accepted In a disaster situation : standing firm To comfort everybody's confidence : the cement of common sense	408 408 410 412
Re	ferences	3	414
•	II	The possible results of this first scenario	415
1.	Succes 1 ° 2 nd	SS When the decisions « hold » and the projects « go through in spite of everything » When simple alerts and even disasters do not cause very strong crises	415 415 417
2.	Difficul	ties	418

3.	Deadlock	424
Re	efrences	425
•	Conclusion : A firm and authoritarian executive for the defence of progress	427
Ch	apter Eight : When the boby politic opens up to the problems raised by major risk	428
•	I <u>New directions for the socio-technical control of major risk</u>	428
1.	 A different status for the safety function 1° Safety, a preoccupation for general management 2nd The interpretation of policies for prevention, battle and reparation 	428 428 430
2.	 A different strategy for safety 1° Prevention adapted to the problem of major risk 2nd Faced with disaster 3° Disaster management, management of a rout 	432 432 433 433
Re	eferences	438
•	II <u>Innovations in the relationship between the citizen and the</u> <u>decisions concerning major risk</u>	440
1.	 Risk assessment » or the political evaluation or major risk 1° The typical aspect of « assessment » 2nd The irreduccible need for social choice 	440 440 442
2.	Modalities for introducing an opening-up of politics1°Information of the citizen2 nd Consultation of the citizen3°Mechanism for irect access by the citizen to the decision making process	446 447 453 462
Re	efrences	463
•	Conclusion : An executive branch determined to face the problem fo major technological risk	465
Ch	apter Nine : when risk calls thhe fundamentals of politics into question	466
•	I Democracy brushed aside by major risk	466
1.	The base line : a culture of ignorance1°An « educative redress », a « process of conditioning »2 nd Managin the change-over to a new culture3°The exclusion of the citizen in times of crisis	466 467 468 472
2.	The economic war : justification of these compromises of the theoretical principles of democracy	472
3.	The ultimate wager	473
Re	efrences	474
•	II The democratic scheme confronted by the challenge of major risk	475
1.	Facing the unprecedented1°The technical challende : high risk, urgency and uncertainty2 nd Democracy out of breath	475 475 477

	3° 4°	The solutions of the past The problem of fear	484 485
2.	Operati 1 ° 2 nd	on base for a start Renunciation The forces which raise the challenge	485 485 487
3.	The We knowled	estern World faced with major risk : questions about dge, power and democracy	490
Ref	References		
•		Conclusion : major technological risk – a problem that subverts the body politic	494
		CONCLUSION GENERALE THE SERIOUSNESS OF OUR FREEDOM	599
1. Faced with major risk			495
2.	2. without waiting for the twilight		498
3.	The sur	rvival of the body politic	501
Annex Index of cases Table of illustrations			503 513 515