

CONTENTS

INTRODUCTION	9
SECTION O: ACCIDENT ASSESSMENT MANAGER PROCEDURES	13
O1 Accident consequence assessment management	15
SECTION A: NUCLEAR CONDITION ASSESSMENT MANAGER PROCEDURES	19
A0 Nuclear condition assessment overview	21
A1 Accident classification	22
A2 Assessment of core or spent fuel damage	46
A2a core damage assessment based on length of the time core is uncovered	47
A2b Core damage assessment based on containment radiation levels	50
A2c Core damage assessment based on coolant isotope concentrations	59
A2d Spent fuel damage assessment	62
A3 Assessment of release routes and conditions	63
SECTION B: PROTECTIVE ACTION MANAGER PROCEDURES	67
B1 Public protective action assessment	69
SECTION C: RADIATION PROTECTION MANAGER PROCEDURES	79
C1 Emergency worker radiation protection guidance	81
SECTION D: ENVIRONMENTAL ANALYST PROCEDURES	83
D1 Environmental assessment	85
SECTION E: PROJECTION ANALYST PROCEDURES	89
E0 Projection analysis overview	91
E1 Projected urgent protective actions distances based on plant conditions	93
E1a Release from the containment	94
E1b Containment by-pass under dry conditions	99
E1c Containment by-pass under wet conditions	102
E1d Release from the spent fuel pool	105
E2 Projected urgent protective action distances based on ambient dose rates in the plume	107
E3 Projected protective action distances based on ambient dose rates from deposition	109
SECTION F: SAMPLE ANALYST PROCEDURES	111
F0 Sample analyst overview	113
F1 Revision of plume exposure OILs and emergency worker turn back guidance	114
F2 Revision of deposition exposure relocation operational intervention level	119
F3 Revision of I-131 and Cs-137 deposition concentration OIL for ingestion	125
F4 Calculation of isotope concentrations in food	128
F5 Evaluation of food restrictions and revision of food OILs	136

Table O 1	Assessment priorities	17
Table A 1	Accident classification the operating, standby and hot shutdown mode	23
Table A2	Accident classification for cold shutdown or refuelling	35
Table A3	Core damage vs. time that core is uncovered	49
Table A4	Normalized monitor readings	51
Table A5	PWR baseline coolant isotope concentrations	60
Table A6	BWR baseline coolant isotope concentrations	61
Table A7	Release route evaluation guide	64
Table A8	Atmospheric release route evaluation guide	65
Table A9	Release rate guide	66
Table B 1	Public protective actions based on classification	72
Table B2	Public protective actions based on projections and in plume measurements	73
Table B3	Public protective actions based on deposition and food measurements	74
Table B4	Default operational intervention levels , assumptions and revisions	75
Table B5	Suggested protective action zones	77
Table C1	Emergency worker tum back dose guidance expressed as integrated external gamma dose	82
Table D1	Environmental monitoring priorities	86
Table F1	Inhalation dose rate conversion factors	117
Table F2	IAEA generic intervention levels for urgent protective actions	120
Table F3	IAEA generic intervention levels for temporary relocation and permanent resettlement	121
Table F4	Shielding factors for surface deposition	121
Table F5	Dose and dose rate conversion factors for exposure to ground contamination	122
Table F6	IAEA generic action levels for food	127
Table F7	Milk concentration conversion factors	129
Table F8	Reduction factors for processing or filtering for food	131
Table F9	IAEA total effective dose guidance for emergency workers	135
Figure O1	Assessment organization	16
Figure A1	Cooling margin - saturation curve	43
Figure A2	Injection required to replace water lost by boiling due to decay heat for a 3000 MW(t) plant	48
Figure A3	Large PWR containment monitor	52
Figure A4	BWR Mark I&II dry well containment monitor	53
Figure A5	BWR Mark I&II wet well containment monitor	54
Figure A6	BWR Mark III dry well containment monitor	55
Figure A7	BWR Mark III containment monitor	56
Figure A8	WVER-230 containment monitor	57
Figure A9	WVER-213 containment monitor	58
Figure E1	Release from the containment - Gap release - No rain	95
Figure E2	Release from the containment - Gap release - Rain	96
Figure E3	Release from the containment - Core melt - No rain	97
Figure E4	Release from the containment - Core melt - Rain	98
Figure E5	Containment by-pass under dry conditions - Gap release	100
Figure E6	Containment by-pass under dry conditions - Core melt	101
Figure E7	Containment by-pass under wet conditions - Normal coolant and spike release	103
Figure E8	Containment by-pass under wet conditions - Gap release and core melt	104
Figure E9	The release from the spent fuel pool - Gap release	106
Figure E10	Measured ambient dose rates at 1 - 2 km from the plant	108

WORKSHEETS	139
Worksheet 01 Response organization assignment	141
Worksheet A1 Plant condition assessment	142
Worksheet B1 Evacuation, thyroid blocking/shelter and relocation map	143
Worksheet B2 Food evaluation and restriction map	144
Worksheet D1 Ambient dose rate around the plant	145
Worksheet D2 Near-field ambient dose rate map	146
Worksheet D3 Far-field ambient dose rate map	147
Worksheet D4 Results from the air sample analysis	148
Worksheet D5 Near-field marker isotope deposition concentration map	149
Worksheet D6 Far-field marker isotope deposition concentration map	150
Worksheet D7 Results from the deposition mix analysis	151
Worksheet D8 Results from the food sample analysis	152
Worksheet E1 Projected protective action distances	153
Worksheet F1 Revision of plume exposure OIL1 and OIL2 and emergency worker turn back guidance	154
Worksheet F2 Revision of deposition exposure OIL4	155
Worksheet F3 Evaluation of food restrictions and revision of food OIL6 and OIL7	156
Worksheet F4 Evaluation of food restrictions and revision of food OIL8 and OIL9	157
APPENDICES	159
Appendix I Assumptions	161
Table IA Cow transfer factors	165
Table IB PWR typical normal coolant concentrations	169
Table IC BWR typical normal coolant concentrations	170
Table ID Fission product inventory	171
Table IE Core release fractions	173
Table IF System particulate/aerosol release reduction factors	174
Table IG Natural particulate/aerosol release reduction factors	175
Table IH Escape fractions	176
Figure IA Relocation deposition dose rate OIL for core meh reactor accident	163
Appendix II InterRAS model	181
Appendix III Dose projections	211
Table IIIA Ingestion dose conversion factor	217
Appendix IV Radioactive half lives, decay data and diagrams	219
SYMBOLS	227
REFERENCES	231
GLOSSARY	235
CONTRIBUTORS TO DRAFTING AND REVIEW	251
INDEX	255