# **Levy Nuclear Plant Units 1 and 2**

**COL Application** 

Part 2

**Final Safety Analysis Report** 

**Revision 4** 

# MASTER TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>	
CHAPTER 1 INTRODUCTION AND GENERAL DESCRIPTION OF THE PLANT			
1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10 APP. 1A APP. 1B	INTRODUCTION  GENERAL PLANT DESCRIPTION	1.2-1 1.3-1 1.4-1 1.5-1 1.6-1 1.8-1 1.9-1 1.10-1 1A-1	
	CHAPTER 2 SITE CHARACTERISTICS		
	SITE CHARACTERISTICS GEOGRAPHY AND DEMOGRAPHY NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES METEOROLOGY HYDROLOGIC ENGINEERING GEOLOGY, SEISMOLOGY, AND GEOTECHNICAL ENGINEERING EARTHQUAKE CATALOG GEOTECHNICAL BORING LOGS SOIL AND ROCK LABORATORY TEST RESULTS	2.1-1 2.2-1 2.3-1 2.4-1 2.5-1 2AA-1 2BB-1	
CHAPTER 3 DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT AND SYSTEMS			
<ul><li>3.1</li><li>3.2</li><li>3.3</li></ul>	CONFORMANCE WITH NUCLEAR REGULATORY COMMISSION GENERAL DESIGN CRITERIA CLASSIFICATION OF STRUCTURES, COMPONENTS, AND SYSTEMS WIND AND TORNADO LOADINGS	3.2-1	

<u>Section</u>	<u>Title</u>	<u>Page</u>
3.4 3.5 3.6	WATER LEVEL (FLOOD) DESIGN	. 3.5-1
3.7 3.8 3.9 3.10	PIPING  SEISMIC DESIGN  DESIGN OF CATEGORY I STRUCTURES  MECHANICAL SYSTEMS AND COMPONENTS  SEISMIC AND DYNAMIC QUALIFICATION OF SEISMIC CATEGORY I MECHANICAL AND ELECTRICAL	3.7-1 3.8-1 3.9-1
3.11 APP. 3A APP. 3B	EQUIPMENT ENVIRONMENTAL QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT HVAC DUCTS AND DUCT SUPPORTS LEAK-BEFORE-BREAK EVALUATION OF THE AP1000	3.11-1
APP. 3C APP. 3D	PIPINGREACTOR COOLANT LOOP ANALYSIS METHODS METHODOLOGY FOR QUALIFYING AP1000 SAFETY-RELATED ELECTRICAL AND MECHANICAL	.3C-1
APP. 3E APP. 3F APP. 3G APP. 3H APP. 3I	EQUIPMENT	3E-1 3F-1 3G-1 3H-1
	CHAPTER 4 REACTOR	
4.1 4.2 4.3 4.4 4.5 4.6	SUMMARY DESCRIPTION FUEL SYSTEM DESIGN	4.2-1 4.3-1 4.4-1 4.5-1
CHAPTER 5 REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS		
5.1 5.2	SUMMARY DESCRIPTIONINTEGRITY OF REACTOR COOLANT PRESSURE BOUNDARY	

<u>Section</u>	<u>Title</u>	<u>Page</u>	
5.3 5.4	REACTOR VESSELCOMPONENT AND SUBSYSTEM DESIGN		
CHAPTER 6 ENGINEERED SAFETY FEATURES			
6.0 6.1 6.2 6.3 6.4 6.5 6.6 APP. 6A	ENGINEERED SAFETY FEATURES	6.1-1 6.2-1 6.3-1 6.4-1 6.5-1	
	CHAPTER 7 INSTRUMENTATION AND CONTROLS		
7.1 7.2 7.3 7.4 7.5 7.6 7.7	INTRODUCTION	7.2-1 7.3-1 7.4-1 7.5-1 7.6-1	
	CHAPTER 8 ELECTRIC POWER		
8.1 8.2 8.3	INTRODUCTIONOFFSITE POWER SYSTEMONSITE POWER SYSTEMS	8.2-1	
CHAPTER 9 AUXILIARY SYSTEMS			
9.1 9.2 9.3	FUEL STORAGE AND HANDLINGWATER SYSTEMSPROCESS AUXILIARIES	9.2-1	

<u>Section</u>	<u>Title</u>	<u>Page</u>	
9.4	AIR-CONDITIONING, HEATING, COOLING, AND		
9.5	VENTILATION SYSTEMOTHER AUXILIARY SYSTEMS	9.5-1	
APP. 9A	FIRE PROTECTION ANALYSIS	9A-1	
	CHAPTER 10		
	STEAM POWER AND CONVERSION		
10.1 10.2	SUMMARY DESCRIPTIONTURBINE-GENERATOR		
10.3	MAIN STEAM SUPPLY SYSTEM		
10.4	OTHER FEATURES OF STEAM AND POWER CONVERSION SYSTEM	10.4-1	
	OUADTED 44		
CHAPTER 11 RADIOACTIVE WASTE MANAGEMENT			
11.1	SOURCE TERMS		
11.2 11.3	LIQUID WASTE MANAGEMENT SYSTEMSGASEOUS WASTE MANAGEMENT SYSTEM		
11.4 11.5	SOLID WASTE MANAGEMENTRADIATION MONITORING		
	OUADTED 40		
	CHAPTER 12 RADIATION PROTECTION		
12.1	ASSURING THAT OCCUPATIONAL RADIATION		
	EXPOSURES ARE AS-LOW-AS-REASONABLY ACHIEVABLE (ALARA)	12.1-1	
12.2	RADIATION SOURCESRADIATION PROTECTION DESIGN FEATURES	12.2-1	
12.3 12.4	DOSE ASSESSMENT	12.4-1	
12.5 APP. 12AA	HEALTH PHYSICS FACILITIES DESIGNRADIATION PROTECTION PROGRAM DESCRIPTION		
	0114 7777 10		
	CHAPTER 13 CONDUCT OF OPERATIONS		
13.1	ORGANIZATIONAL STRUCTURE OF APPLICANT		
13.2 13.3	TRAINING EMERGENCY PLANNING	13.2-1 13.3-1	
13.4 13.5	OPERATIONAL PROGRAMSPLANT PROCEDURES	13.4-1	
10.0	I LANT I NOOLDONLO	13.5-1 Rev 4	

Section	<u>Title</u>	<u>Page</u>		
13.6 13.7 APP. 13AA	SECURITYFITNESS FOR DUTYCONSTRUCTION-RELATED ORGANIZATION	13.7-1		
	CHAPTER 14 INITIAL TEST PROGRAM			
14.1 14.2 14.3 14.4 APP. 14A	SPECIFIC INFORMATION TO BE INCLUDED IN PRELIMINARY/FINAL SAFETY ANALYSIS REPORTS SPECIFIC INFORMATION TO BE INCLUDED IN STANDAR SAFETY ANALYSIS REPORTS CERTIFIED DESIGN MATERIAL	D . 14.2-1 . 14.3-1 . 14.4-1		
	CHAPTER 15 ACCIDENT ANALYSES			
15.0 15.1 15.2 15.3 15.4 15.5 15.6 15.7 15.8 APP. 15A	ACCIDENT ANALYSES INCREASE IN HEAT REMOVAL FROM THE PRIMARY SYSTEM DECREASE IN HEAT REMOVAL BY THE SECONDARY SYSTEM DECREASE IN REACTOR COOLANT SYSTEM FLOW RATE REACTIVITY AND POWER DISTRIBUTION ANOMALIES INCREASE IN REACTOR COOLANT INVENTORY DECREASE IN REACTOR COOLANT INVENTORY RADIOACTIVE RELEASE FROM A SUBSYSTEM OR COMPONENT ANTICIPATED TRANSIENTS WITHOUT SCRAM EVALUATION MODELS AND PARAMETERS FOR ANALYSIS OF RADIOLOGICAL CONSEQUENCES OF ACCIDENTS REMOVAL OF AIRBORNE ACTIVITY FROM THE CONTAINMENT ATMOSPHERE FOLLOWING A LOCA	.15.1-1 .15.2-1 .15.3-1 .15.4-1 .15.5-1 .15.6-1 .15.7-1 .15.8-1		
CHAPTER 16 TECHNICAL SPECIFICATIONS				
16.1 16.2	TECHNICAL SPECIFICATIONSDESIGN RELIABILITY ASSURANCE PROGRAM			

<u>Section</u>	<u>Title</u>	<u>Page</u>
16.3	INVESTMENT PROTECTION	.16.3-1
	CHAPTER 17 QUALITY ASSURANCE	
17.1	QUALITY ASSURANCE DURING THE DESIGN AND CONSTRUCTION PHASES	17 1-1
17.2	QUALITY ASSURANCE DURING THE OPERATIONS PHASE	
17.3	QUALITY ASSURANCE DURING DESIGN, PROCUREMENT, FABRICATION, INSPECTION, AND/OR TESTING OF NUCLEAR POWER PLANT ITEMS	
17.4 17.5	DESIGN RELIABILITY ASSURANCE PROGRAMQUALITY ASSURANCE PROGRAM DESCRIPTION – NEW	. 17.4-1
17.6 17.7	LICENSE APPLICANTS	. 17.6-1 . 17.7-1
17.8	REFERENCES	. 17.8-1
	CHAPTER 18 HUMAN FACTORS ENGINEERING	
18.1 18.2	OVERVIEWHUMAN FACTORS ENGINEERING PROGRAM	
18.3 18.4	MANAGEMENT OPERATING EXPERIENCE REVIEW FUNCTIONAL REQUIREMENTS ANALYSIS AND	. 18.3-1
18.5 18.6	ALLOCATIONAP1000 TASK ANALYSIS IMPLEMENTATION PLAN	. 18.5-1
18.7	INTEGRATION OF HUMAN RELIABILITY ANALYSIS WITH HUMAN FACTORS ENGINEERING	. 18.7-1
18.8 18.9	HUMAN SYSTEM INTERFACE DESIGNPROCEDURE DEVELOPMENT	.18.9-1
18.10 18.11	TRAINING PROGRAM DEVELOPMENTHUMAN FACTORS ENGINEERING VERIFICATION AND VALIDATION	
18.12 18.13 18.14	INVENTORY DESIGN IMPLEMENTATION HUMAN PERFORMANCE MONITORING	.18.12-1 .18.13-1

<u>Section</u>	<u>Title</u>	<u>Page</u>
	CHAPTER 19 PROBABILISTIC RISK ASSESSMENT	
19.1	INTRODUCTION	19.1-1
19.2	INTERNAL INITIATING EVENTS	19.2-1
19.3	MODELING OF SPECIAL INITIATORS	19.3-1
19.4	EVENT TREE MODELS	19.4-1
19.5	SUPPORT SYSTEMS	19.5-1
19.6	SUCCESS CRITERIA ANALYSIS	19.6-1
19.7	FAULT TREE GUIDELINES	19.7-1
19.8	PASSIVE CORE COOLING SYSTEM - PASSIVE RESIDUA	۸L
	HEAT REMOVAL	19.8-1
19.9	PASSIVE CORE COOLING SYSTEM - CORE MAKEUP	
	TANKS	
19.10	PASSIVE CORE COOLING SYSTEM - ACCUMULATOR	19.10-1
19.11	PASSIVE CORE COOLING SYSTEM - AUTOMATIC	
	DEPRESSURIZATION SYSTEM	
19.12	PASSIVE CORE COOLING SYSTEM - IN-CONTAINMENT	
	REFUELING WATER STORAGE TANK	
19.13	PASSIVE CONTAINEMENT COOLING	
19.14	MAIN AND STARTUP FEEDWATER SYSTEM	
19.15	CHEMICAL AND VOLUME CONTROL SYSTEM	
19.16	CONTAINMENT HYDROGEN CONTROL SYSTEM	
19.17	NORMAL RESIDUAL HEAT REMOVAL SYSTEM	
19.18	COMPONENT COOLING WATER SYSTEM	
19.19	SERVICE WATER SYSTEM	
19.20	CENTRAL CHILLED WATER SYSTEM	
19.21	AC POWER SYSTEM	
19.22	CLASS 1E DC & UPS SYSTEM	
19.23	NON-CLASS 1E DC & UPS SYSTEM	
19.24	CONTAINMENT ISOLATION	19.24-1
19.25	COMPRESSED AND INSTRUMENT AIR SYSTEM	
19.26	PROTECTION AND SAFETY MONITORING SYSTEM	
19.27	DIVERSE ACTUATION SYSTEM	
19.28	PLANT CONTROL SYSTEM	
19.29	COMMON CAUSE ANALYSIS	19.29-1
19.30	HUMAN RELIABILITY ANALYSIS	19.30-1
19.31	OTHER EVENT TREE NODE PROBABILITIES	
19.32	DATA ANALYSIS AND MASTER DATA BANK	
19.33	FAULT TREE AND CORE DAMAGE QUANTIFICATION	
19.34	SEVERE ACCIDENT PHENOMENA TREATMENT	
19.35	CONTAINMENT EVENT TREE ANALYSIS	
19.36	REACTOR COOLANT SYSTEM DEPRESSURIZATION	
19.37	CONTAINMENT ISOLATION	19.37-1

<u>Section</u>	<u>Title</u>	<u>Page</u>
19.38	REACTOR VESSEL REFLOODING	. 19.38-
19.39	IN-VESSEL RETENTION OF MOLTEN CORE DEBRIS	. 19.39-
19.40	PASSIVE CONTAINMENT COOLING	
19.41	HYDROGEN MIXING AND COMBUSTION ANALYSIS	. 19.41-
19.42	CONDITIONAL CONTAINMENT FAILURE PROBABILITY	
	DISTRIBUTION	. 19.42-
19.43	RELEASE FREQUENCY QUANTIFICATION	. 19.43-
19.44	MAAP4.0 CODE DESCRIPTION AND AP1000 MODELING	. 19.44-
19.45	FISSION PRODUCT SOURCE TERMS	. 19.45-
19.46	NOT USED	19.46-
19.47	NOT USED	19.47-
19.48	NOT USED	
19.49	OFFSITE DOSE EVALUATION	
19.50	IMPORTANCE AND SENSITIVITY ANALYSIS	. 19.50-
19.51	UNCERTAINTY ANALYSIS	. 19.51-
19.52	NOT USED	. 19.52-
19.53	NOT USED	
19.54	LOW POWER AND SHUTDOWN PRA ASSESSMENT	
19.55	SEISMIC MARGIN ANALYSIS	
19.56	PRA INTERNAL FLOODING ANALYSIS	. 19.56-
19.57	INTERNAL FIRE ANALYSIS	
19.58	WINDS, FLOODS, AND OTHER EXTERNAL EVENTS	
19.59	PRA RESULTS AND INSIGHTS	. 19.59-
APP. 19A	THERMAL HYDRAULIC ANALYSIS TO SUPPORT	
	SUCCESS CRITERIA	
APP. 19B	EX-VESSEL SEVERE ACCIDENT PHENOMENA	. 19B-1
APP. 19C	ADDITIONAL ASSESSMENT OF AP1000 DESIGN	
	FEATURES	
APP. 19D	EQUIPMENT SURVIVABILITY ASSESSMENT	
APP. 19E	SHUTDOWN EVALUATION	
APP. 19F	MALEVOLENT AIRCRAFT IMPACT	.19F-1