

CHAPTER 1

INTRODUCTION AND GENERAL DESCRIPTION OF THE PLANT

1.1 Introduction

This Design Control Document (DCD) for a simplified passive advanced light water reactor plant is submitted to the NRC for review and approval under the provisions of 10 CFR Part 52. This descriptive information for the AP600 has been evaluated and accepted by the Nuclear Regulatory Commission (NRC) as documented in NUREG-1512. For the purposes of the DCD, this material on the description and analysis of the AP600 is termed "Tier 2 Material." This DCD is submitted as part of the application for design certification of the AP600 in accordance with 10 CFR 52 Subpart B.

1.1.1 Plant Location

The AP600 is a standardized plant that is to be placed on a site with parameters described in Chapter 2, "Site Characteristics". The site parameters relate to the seismology, hydrology, meteorology, geology, heat sink, and other site-related aspects.

1.1.2 Containment Type

The containment building is a freestanding, cylindrical, steel containment vessel with elliptical upper and lower heads. It is surrounded by a seismic Category I reinforced concrete shield building. The containment vessel is an integral part of the passive containment cooling system. The vessel provides the safety-related interface with the ultimate heat sink, which is the surrounding atmosphere. Westinghouse is responsible, along with their contractor team members, for the design of the containment.

1.1.3 Reactor Type

The nuclear steam supply system (NSSS) for the AP600 is a Westinghouse-designed pressurized water reactor.

1.1.4 Power Output

The plant's net producible electrical power to the grid is at least 600 MWe, with a nuclear steam supply system power rating (core plus reactor coolant pump heat) of 1940 MWt. In some safety evaluations a power level of 102 percent of the rated power level is employed.

1.1.5 Schedule

The scheduled completion date and estimated commercial operation date of nuclear power plants referencing the AP600 design certification are provided by the Combined License applicant.

1.1.6 Format and Content**1.1.6.1 Regulatory Guide 1.70**

To the extent practical, the AP600 DCD has used as a guide the format and content recommendations of Regulatory Guide 1.70, Revision 3, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants - LWR Edition," November 1978.

The DCD generally uses the same chapter, section, subsection, and paragraph headings used in the standard format. Where appropriate, the DCD is subdivided beyond the extent of the standard format to provide additional information specifically required for that area. Similarly, some of the passive features of the AP600 require modification of the standard format and content either in terms of placement or type of material presented.

1.1.6.2 Standard Review Plan

The technical guidance provided in NUREG-0800, is followed in the preparation of the AP600 DCD. Standard Review Plan conformance is also determined in accordance with 10 CFR 50.34 to identify the deviations of the AP600 DCD from the Standard Review Plan. See subsection 1.9.2 for additional details on Standard Review Plan conformance.

1.1.6.3 Text, Tables and Figures

AP600 DCD tables of data are identified by the section or subsection number followed by a sequential number (for example, Table 3.3-5 is the fifth table of Section 3.3). Tables are located at the end of the section immediately following the text. Drawings, pictures, sketches, curves, graphs, plots, and engineering diagrams are identified as figures and are numbered sequentially by section or subsection similar to tables, and follow at the end of the applicable section or subsection.

1.1.6.4 Numbering of Pages

Text pages are numbered sequentially within each section or subsection.

1.1.6.5 Proprietary Information

The AP600 DCD contains no proprietary information.

1.1.6.6 DCD Acronyms

Table 1.1-1 provides a list of acronyms used in the AP600 DCD. Acronyms for systems are defined in the section in which they are used. Other acronyms may be defined in the section in which they are used. Table 1.7-2 provides a list of AP600 system designators.

1.1.7 Combined License Information

Combined License applicants referencing the AP600 certified design will provide the construction and startup schedule information.

Table 1.1-1 (Sheet 1 of 4)

AP600 DCD ACRONYMS

ac	-	Alternating Current
ACI	-	American Concrete Institute
ACRS	-	Advisory Committee on Reactor Safeguards
ADS	-	Automatic Depressurization System
AISC	-	American Institute of Steel Construction
AISI	-	American Iron and Steel Institute
ALARA	-	As-Low-As-Reasonably Achievable
ALWR	-	Advanced Light Water Reactor
AMCA	-	Air Movement and Control Association
ANS	-	American Nuclear Society
ANL	-	Argonne National Laboratory
ANSI	-	American National Standards Institute
API	-	American Petroleum Institute
ARI	-	Air Conditioning and Refrigeration Institute
ASCE	-	American Society of Civil Engineers
ASHRAE	-	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
ATWS	-	Anticipated Transient Without Scram
AWS	-	American Welding Society
BEACON	-	Best Estimate Analyzer for Core Operations - Nuclear
BOL	-	Beginning of Life
BOP	-	Balance of Plant
BTP	-	Branch Technical Position
CFR	-	Code of Federal Regulations
CHF	-	Critical Heat Flux
CMAA	-	Crane Manufacturers Association of American
CMT	-	Core Makeup Tank
CRD	-	Control Rod Drive
CRDM	-	Control Rod Drive Mechanism
CVS	-	Chemical and Volume Control System
DAC	-	Design Acceptance Criteria
dc	-	Direct Current
DBA	-	Design Basis Accident
DBE	-	Design Basis Event
DCD	-	Design Control Document
DEH	-	Digital Electrohydraulic
DEMA	-	Diesel Engine Manufacturers Association
DNB	-	Departure from Nucleate Boiling
DNBR	-	Departure from Nucleate Boiling Ratio
DOE	-	Department of Energy
DPU	-	Distributed Processing Unit
EFPD	-	Effective Full Power Days
EIS	-	Environmental Impact Statement

Table 1.1-1 (Sheet 2 of 4)

AP600 DCD ACRONYMS

EMI	-	Electromagnetic Interference
EOF	-	Emergency Offsite Facility
EPA	-	Environmental Protection Agency
EPRI	-	Electric Power Research Institute
ER	-	Environmental Report
ERF	-	Emergency Response Facility
ESF	-	Engineered Safety Features
ESFAS	-	Engineered Safety Features Actuation System
FID	-	Fixed Incore Detector
FM	-	Factory Mutual Engineering and Research Corporation
FMEA	-	Failure Modes and Effects Analysis
FWPCA	-	Federal Water Pollution Control Act
GDC	-	General Design Criteria
GSI	-	Generic Safety Issues
HEPA	-	High Efficiency Particulate Air
HFE	-	Human Factors Engineering
HVAC	-	Heating, Ventilation and Air Conditioning
I&C	-	Instrumentation and Control
ICEA	-	Insulated Cable Engineers Association
IDCOR	-	Industry Degraded Core Rulemaking
IEEE	-	Institute of Electrical and Electronics Engineers
IES	-	Illumination Engineering Society
ILRT	-	Integrated Leak Rate Test
INEL	-	Idaho National Engineering Laboratory
I/O	-	Input/Output
IRWST	-	In Containment Refueling Water Storage Tank
ISA	-	Instrument Society of America
ISI	-	Inservice Inspection
IST	-	Inservice Testing
ITAAC	-	Inspections, Tests, Analyses and Acceptance Criteria
LOCA	-	Loss of Coolant Accident
LOF	-	Loss-of-Flow with Failure to Scram
LOFT	-	Loss of Flow Test
LOOP	-	Loss of Offsite Power
LOSP	-	Loss of System Pressure with Degraded ECCS Operation
LPZ	-	Low Population Zone
LWR	-	Light Water Reactor
MAAP	-	Modular Accident Analysis Programs
MCC	-	Motor Control Center
MCR	-	Main Control Room

Table 1.1-1 (Sheet 3 of 4)

AP600 DCD ACRONYMS

MCRHS	-	Main Control Room Habitability System
MFCV	-	Main Feedwater Control Valve
MFIV	-	Main Feedwater Isolation Valve
M-MIS	-	Man-Machine Interface System
MOV	-	Motor-operated Valves
MPC	-	Maximum Permissible Concentration
MSIV	-	Main Steam Isolation Valve
MSLB	-	Main Steam Line Break
MTBE(F)	-	Mean Time Between Event (Failure)
MW	-	Megawatt
MWe	-	Megawatt, electric
MWt	-	Megawatt, thermal
NAE	-	National Academy of Engineering
NAS	-	National Academy of Sciences
NBS	-	National Bureau of Standards
NEC	-	National Electrical Code
NEI	-	Nuclear Energy Institute
NEMA	-	National Electrical Manufacturers Association
NFPA	-	National Fire Protection Association
NPSH	-	Net Positive Suction Head
NRC	-	Nuclear Regulatory Commission
NSSS	-	Nuclear Steam Supply System
NUMARC	-	Nuclear Management and Resources Council (Superceded by NEI)
NUREG	-	Report designator for NRC reports
ORE	-	Occupation Radiation Exposure
PCS	-	Passive Containment Cooling System
P&ID	-	Piping and Instrumentation Diagram
PRA	-	Probabilistic Risk Assessment
PRHR	-	Passive Residual Heat Removal
PRHR HX	-	Passive Residual Heat Removal Heat Exchanger
PWR	-	Pressurized Water Reactor
PXS	-	Passive Core Cooling System
QA	-	Quality Assurance
RAM	-	Reliability, Availability, Maintainability
RAP	-	Reliability Assurance Program
RCS	-	Reactor Coolant System
RCDT	-	Reactor Coolant Drain Tank
RFI	-	Radio Frequency Interference
R.G.	-	Regulatory Guide
RNS	-	Normal Residual Heat Removal
RSW	-	Remote Shutdown Workstation

Table 1.1-1 (Sheet 4 of 4)

AP600 DCD ACRONYMS

RV	-	Reactor Vessel
SECY	-	Secretary of the Commission Letter
SER	-	Safety Evaluation Report
SMACNA	-	Sheet Metal and Air Conditioning Contractors National Association
SRP	-	Standard Review Plan
SSAR	-	Standard Safety Analysis Report
SSD	-	System Specification Document
SSI	-	Soil Structure Interaction
SSE	-	Safe Shutdown Earthquake
SUFCV	-	Startup Feedwater Control Valve
SUFIV	-	Startup Feedwater Isolation Valve
TID	-	Total Integrated Dose
TMI	-	Three Mile Island
TSC	-	Technical Support Center
UBC	-	Uniform Building Code
UL	-	Underwriters Laboratories
UPS	-	Uninterruptable Power Supply
URD	-	Utility Requirements Document
USI	-	Unresolved Safety Issue
USPHS	-	United States Public Health Service
WCAP	-	Westinghouse report designator, originally Westinghouse Commercial Atomic Power