CHAPTER 1

INTRODUCTION AND GENERAL DESCRIPTION OF THE PLANT

1.1 Introduction

This Design Control Document (DCD) for the Westinghouse AP1000 simplified passive advanced light water reactor plant is incorporated by reference into the Design Certification Rule for the AP1000 design (Section II.A) of Appendix D to 10 CFR Part 52. The DCD is also submitted to the NRC for review and approval of an application for an amendment to the Design Certification Rule for the AP1000.

1.1.1 Plant Location

The AP1000 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 shield building constructed of reinforced concrete and steel concrete composite modules. 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 AP1000 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 1000 MWe, with a core power rating of 3400 MWt. In some safety evaluations a power level higher than 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 AP1000 design certification are provided as discussed in subsection 1.1.7.

1.1.6 Format and Content

1.1.6.1 Regulatory Guide 1.70

To the extent practical, the AP1000 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 AP1000 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 AP1000 DCD. Standard Review Plan conformance is also determined in accordance with 10 CFR 50.34 to identify the deviations of the AP1000 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

AP1000 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 AP1000 DCD contains no proprietary information.

1.1.6.6 DCD Acronyms

Table 1.1-1 provides a list of acronyms used in the AP1000 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 AP1000 system designators.

1.1.7 Combined License Information

Combined License applicants referencing the AP1000 certified design will provide the construction and startup schedule information.

Table 1.1-1 (Sheet 1 of 4)

AP1000 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
COL	Combined Operating License/Combined License
CRDM	Control Rod Drive Mechanism
CSA	Control Support Area
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

Table 1.1-1 (Sheet 2 of 4)

AP1000 DCD ACRONYMS

D-EHC	Digital Electrohydraulic Control
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
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

Table 1.1-1 (Sheet 3 of 4)

AP1000 DCD ACRONYMS

ITAAC	Inspections, Tests, Analyses and Acceptance Criteria
LBB	Leak-Before-Break
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
LSB	Last Stage Blade
LWR	Light Water Reactor
MAAP	Modular Accident Analysis Programs
MCC	Motor Control Center
MCR	Main Control Room
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 (Superseded by NEI)
NUREG	Report designator for NRC reports

Table 1.1-1 (Sheet 4 of 4)

AP1000 DCD ACRONYMS

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
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
SSE	Safe Shutdown Earthquake
SSI	Soil Structure Interaction
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	Uninterruptible 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