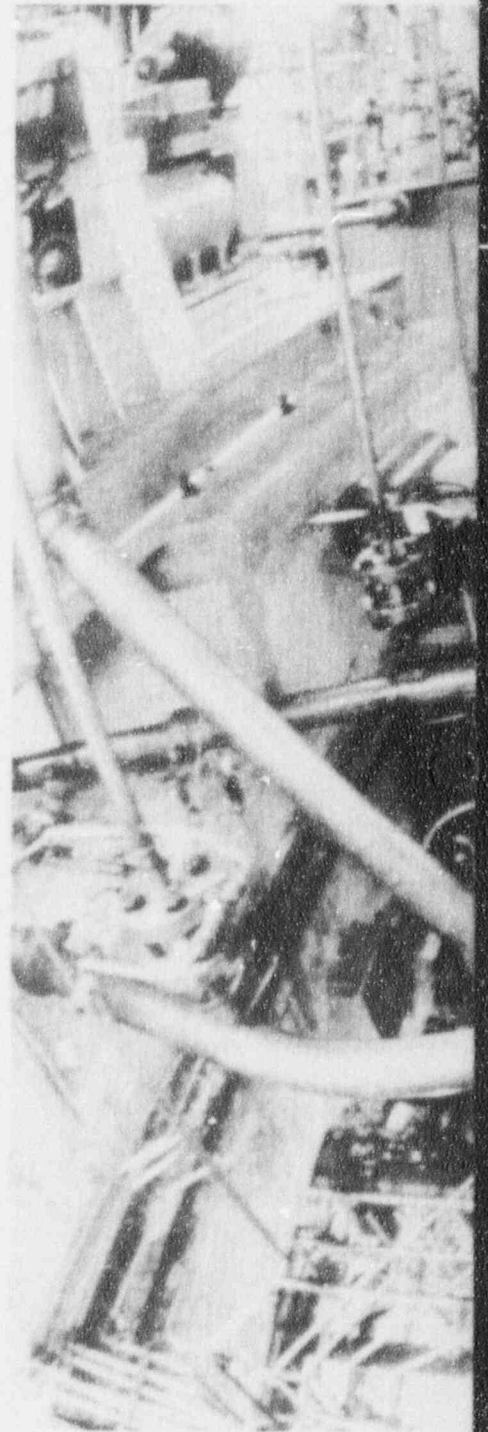
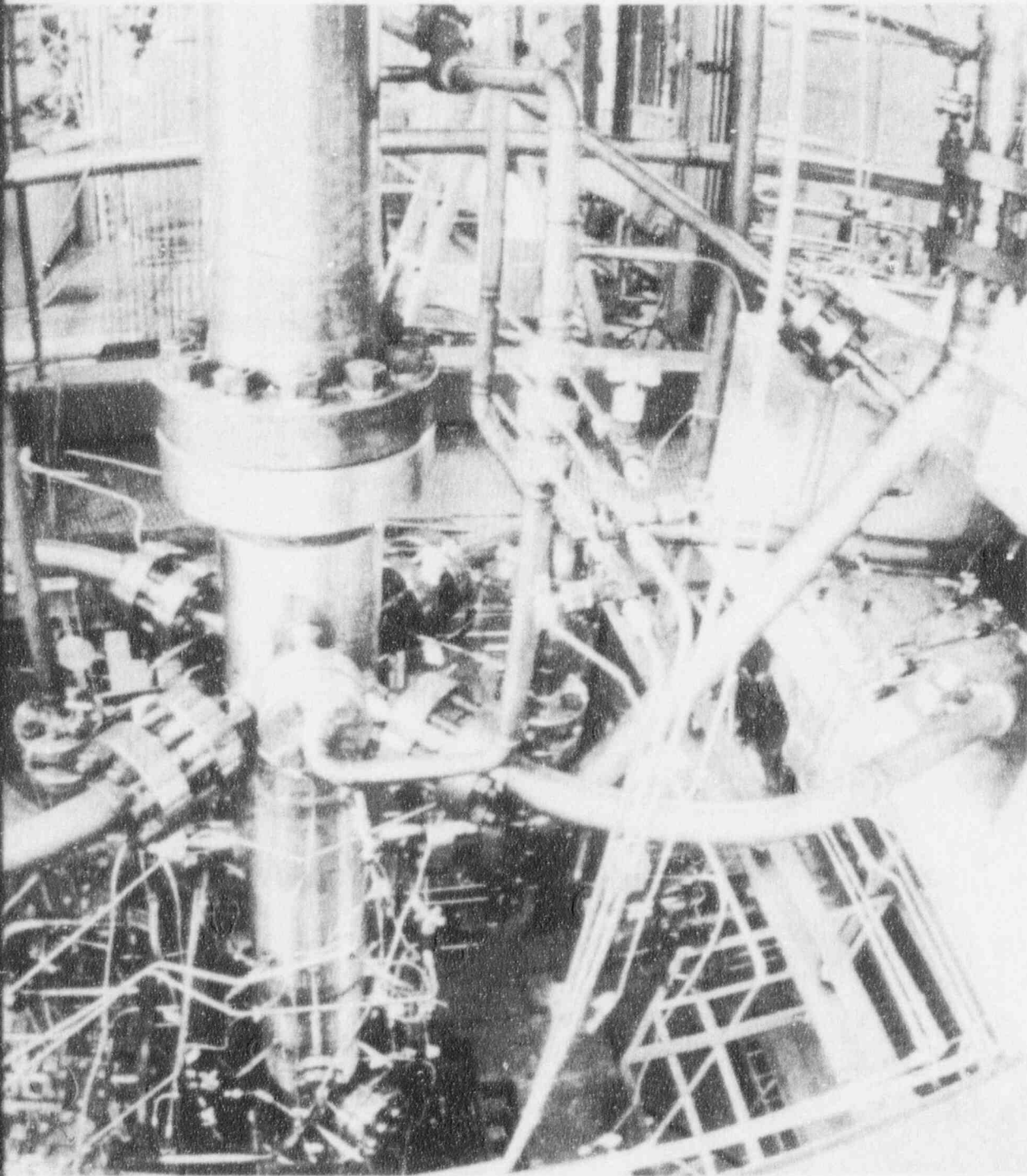

AP600 DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

Revision 6
May 5, 1994



AP600

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Height, Full Pressure Integral Systems Test (SPES-2)

**AP600 DESIGN CERTIFICATION
TEST PROGRAM OVERVIEW**

Revision 6
May 5, 1994

AP600 TEST PROGRAMS: TABLE 1 - TEST PROGRAM OVERVIEW (PART 1)					
Item No.	TEST DESCRIPTION	FACILITY LOCATION	SCALE	CATEGORY	TESTING STATUS
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN					
1	Air Flow Path Delta P Test	W Science & Technology Center - Churchill, PA	1:6 linear	Basic Research	Completed
2	Water Film Formation Test	W Science & Technology Center - Churchill, PA	N/A	Basic Research	Completed
3	Heated Plate Test	W Science & Technology Center - Churchill, PA	N/A	Basic Research	Completed
4	Bench Wind Tunnel Experiment	W Science & Technology Center - Churchill, PA	1:120 linear	Basic Research	Completed
5	Condensation Tests - Bare surface upward	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
6	Condensation Tests - Bare surface downward	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
7	Condensation Tests - Painted surface down	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
8	Condensation Tests - Light noncondensibles	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
9	Condensation Tests - Stagnation Flow Conditions	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
10	Condensation Tests - Stagnation/light noncondensibles	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
11	Condensation Tests - 2D condensation	University of Wisconsin - Madison, WI	N/A	Basic Research	In Progress
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION					
12	Integral (small scale) Tests - Phase 1 (Feasibility)	W Science & Technology Center - Churchill, PA	1:3 height 1:40 diameter	Safety Related	Completed
13	Integral (small scale) Tests - Phase 2A (Extension Tests)	W Science & Technology Center - Churchill, PA	1:3 height 1:40 diameter	Safety Related	Completed
14	Integral (small scale) Tests - Phase 2B (Continuation Tests)	W Science & Technology Center - Churchill, PA	1:3 height 1:40 diameter	Safety Related	Completed
15	1/8th Scale Heat Transfer Test - Phase 1 (Baseline)	W Science & Technology Center - Churchill, PA	~1:8 linear	Safety Related	Completed
16	1/8th Scale Heat Transfer Test - Phase 2 (Confirmatory)	W Science & Technology Center - Churchill, PA	~1:8 linear	Safety Related	Completed
17	Water Distribution System Test - Phase 1 (20ft Diameter)	W Waltz Mill Site - Madison, PA	1:1	Safety Related	Completed
18	Water Distribution System Test - Phase 2 (1/8th Sector)	W Waltz Mill Site - Madison, PA	1:1	Safety Related	Completed
19	Water Distribution System Test - Phase 3 (1/8th sector with selected distribution system)	W Waltz Mill Site - Madison, PA	1:1	Safety Related	Completed
20	Wind Tunnel Test - Phase 1	Univ. of Western Ontario - London, Ontario	~1:100 linear	Safety Related	Completed
21	Wind Tunnel Test - Phase 2	Univ. of Western Ontario - London, Ontario	~1:100 linear	Safety Related	Completed
22	Wind Tunnel Test - Phase 4A	CNRC Wind Tunnel - Ottawa, Canada	1:30 linear	Safety Related	Completed
23	Wind Tunnel Test Phase 4B	Univ. of Western Ontario - London, Ontario	1:500 linear	Safety Related	Completed

AP600 TEST PROGRAMS: TABLE 1 - TEST PROGRAM OVERVIEW (PART 1)					
Item No.	TEST DESCRIPTION	FACILITY LOCATION	SCALE	CATEGORY	TESTING STATUS
PASSIVE CORE COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION					
24	PRHR Heat Exchanger Test - Phase 1	W Science & Technology Center - Churchill, PA	1:1 height	Safety Related	Completed
25	PRHR Heat Exchanger Test - Phase 2	W Science & Technology Center - Churchill, PA	1:1 height	Safety Related	Completed
26	Automatic Depressurization System Test - Phase A (sparger)	ENEA (VAPORE facility) - Casaccia, Italy	1:1	Safety Related	Completed
27	Automatic Depressurization Systems Test - Phase B	ENEA (VAPORE facility) - Casaccia, Italy	1:1	Safety Related	Planned
28	Core Makeup Tank Test	W Waltz Mill Site - Madison, PA	-1:8 diameter -1:2 height	Safety Related	In Progress
29	DNBR Tests	Columbia University - New York, NY	1:1	Safety Related	Completed
30	Low Pressure 1/4 Height Integral Systems Tests	Oregon State University - Corvallis, OR	1:4 height 1:192 volume	Safety Related	Planned
31	Full Pressure Full Height Integral Systems Tests	SIET (SPES-2 Facility) - Piacenza, Italy	1:1 height 1:395 volume	Safety Related	In Progress

AP600 TEST PROGRAMS: TABLE 2 - TEST PROGRAM OVERVIEW (PART 2)					
Item No.	TEST NAME	TEST SCHEDULE			
		Start	End	SCHEDULE	
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN					
1	Air Flow Path Delta P Test	January 1988	February 1988	Completed	N/A
2	Water Film Formation Test	February 1988	March 1988	Completed	N/A
3	Heated Plate Test	April 1988	June 1988	Completed	N/A
4	Bench Wind Tunnel Experiment	August 1988	September 1988	Completed	N/A
5	Condensation Tests - Bare surface upward	September 1988	December 1988	Completed	N/A
6	Condensation Tests - Bare surface downward	September 1989	December 1989	Completed	N/A
7	Condensation Tests - Painted surface downward	September 1990	December 1990	Completed	N/A
8	Condensation Tests - Light noncondensibles	September 1991	December 1991	Completed	N/A
9	Condensation Tests - Stagnation flow conditions	September 1992	March 1993	Completed	N/A
10	Condensation Tests - Stagnation/Light noncondensibles	March 1993	July 1993	Completed	N/A
11	Condensation Tests - 2D Condensation	January 1994	June 1994	In Progress	N/A
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION					
12	Integral (small scale) Tests - Phase 1 (Feasibility)	May 1989	October 1989	Completed	N/A
13	Integral (small scale) Tests - Phase 2A (Extension Tests)	January 1990	June 1990	Completed	N/A
14	Integral (small scale) Tests - Phase 2B (Continuation Tests)	June 1992	August 1992	Completed	N/A
15	1/8th Scale Heat Transfer Test - Phase 1 (Baseline)	February 1992	June 1992	Completed	N/A
16	1/8th Scale Heat Transfer Test - Phase 2 (Confirmatory)	June 1993	September 1993	Completed	N/A
17	Water Distribution System Test - Phase 1 (20ft Diameter)	June 1991	August 1991	Completed	N/A
18	Water Distribution System Test - Phase 2 (1/8th Sector)	September 1991	February 1992	Completed	N/A
19	Water Distribution System Test - Phase 3	September 1993	September 1993	Completed	N/A
20	Wind Tunnel Test - Phase 1	June 1991	August 1991	Completed	N/A
21	Wind Tunnel Test - Phase 2	February 1992	March 1992	Completed	N/A
22	Wind Tunnel Test - Phase 4A	June 1993	August 1993	Completed	N/A
23	Wind Tunnel Test Phase 4B	September 1993	September 1993	Completed	N/A
PASSIVE CORE COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION					
24	PRHR Heat Exchanger Test - Phase 1	November 1989	January 1990	Completed	N/A
25	PRHR Heat Exchanger Test - Phase 2	July 1990	November 1990	Completed	N/A
26	Automatic Depressurization System Test - Phase A (sparger)	June 1992	November 1992	Completed	N/A
27	Automatic Depressurization Systems Test - Phase B	July 1994	November 1994	Chart 1	Table 4
28	Core Makeup Tank Test	February 1994	August 1994	Chart 1	Table 5
29	DNBR Tests	June 1993	February 1994	Completed	N/A
30	Low Pressure 1/4 Height Integral Systems Tests	July 1994	February 1995	Chart 1	Table 6
31	Full Pressure Full Height Integral Systems Tests	February 1994	November 1994	Chart 1	Table 7

AP600 TEST PROGRAMS: TABLE 3 - TEST PROGRAM OVERVIEW (PART 3)						
Item No.	TEST DESCRIPTION	REVIEW MEETINGS				
			Test Matrix	Scaling Report	Test Specification	Operating Pr
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN						
1	Air Flow Path Delta P Test	-	N/A	N/A	N/A	N/A
2	Water Film Formation Test	-	N/A	N/A	N/A	N/A
3	Heated Plate Test	-	N/A	N/A	N/A	N/A
4	Bench Wind Tunnel Experiment	-	N/A	N/A	N/A	N/A
5	Condensation Tests - Bare surface upward	-	Reference 5.3	N/A	N/A	N/A
6	Condensation Tests - Bare surface downward	-	Reference 6.3	N/A	N/A	N/A
7	Condensation Tests - Painted surface downward	-	WCAP-13307	N/A	N/A	N/A
8	Condensation Tests - Light noncondensibles	-	Reference 8.2	N/A	N/A	N/A
9	Condensation Tests - Stagnation flow conditions	-	Reference 9.2	N/A	N/A	N/A
10	Condensation Tests - Stagnation/light noncondensibles	-	Reference 10.2	N/A	N/A	N/A
11	Condensation Tests - 2D condensation	-	8/94	N/A	N/A	N/A
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION						
12	Integral (small scale) Tests - Phase 1 (Feasibility)	-	WCAP-12667, Rev 1	N/A	N/A	Completed
13	Integral (small scale) Tests - Phase 2A (Extension Tests)	-	Presentation Mat'l from 3/17/92 meeting w/ NRC	N/A	WCAP-13315	Completed
14	Integral (small scale) Tests - Phase 2B (Continuation Tests)	-	Presentation Mat'l from 3/17/92 meeting w/ NRC	N/A	WCAP-13315	Completed
15	1/8th Scale Heat Transfer Test - Phase 1 (Baseline)	-	WCAP-13566	WCAP-13246	WCAP-13267	Completed
16	1/8th Scale Heat Transfer Test - Phase 2 (Confirmatory)	3/23-24/93 2/23-24/94	W Letter ET-NRC-93-3845	WCAP-13246	WCAP-13267	Completed
17	Water Distribution System Test - Phase 1 (20ft Diameter)	-	WCAP-13290	N/A	WCAP-13290	Completed
18	Water Distribution System Test - Phase 2 (1/8th Sector)	-	WCAP-13290	N/A	WCAP-13290	Completed
19	Water Distribution System Test - Phase 3	-	WCAP-13816	N/A	WCAP-13816	Completed
20	Wind Tunnel Test - Phase 1	-	WCAP-13294	WCAP-13294	WCAP-13318	Completed
21	Wind Tunnel Test - Phase 2	-	WCAP-13323	WCAP-13323 WCAP-13294	WCAP-13318	Completed
22	Wind Tunnel Test - Phase 4A	-	WCAP-13756	5/94	WCAP-13318	Completed
23	Wind Tunnel Test Phase 4B	-	WCAP-14005	7/94	WCAP-13318	Completed

AP600 TEST PROGRAMS: TABLE 3 - TEST PROGRAM OVERVIEW (PART 3)						
Item No.	TEST DESCRIPTION	REVIEW MEETINGS	Test Matrix	Scaling Report	Test Specification	Operating Pr
24	PRHR Heat Exchanger Test - Phase 1	-	WCA ^D -12666	N/A	N/A	Completed
25	PRHR Heat Exchanger Test - Phase 2	-	WCAP-12980	N/A	WCAP-13368	Completed
26	Automatic Depressurization System Test - Phase A (Sparger)	5/26-27/93	WCAP-13342	N/A	WCAP-13342	Completed
27	Automatic Depressurization Systems Test - Phase B	5/26-27/93 2/25/94	Table 4	N/A	WCAP-13342 To be revised 6/94	6/94
28	Core Makeup Tank Test	2/25/93 3/14/94	Table 5	WCAP-13963	WCAP-13345, R2 To be revised 5/94	Series 100-30 Series 400-50
29	DNBR Tests	-	N/A	N/A	WCAP-12488	Completed
30	Low Pressure 1/4 Height Integral Systems Tests	12/9/92 9/20-21/93	Table 6	5/94	WCAP-13234	4/94-6/94
31	Full Pressure Full Height Integral Systems Tests	12/10/92	Table 7	WCAP-13277	WCAP-14053	12/93 - 5/94

AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

TABLE 4 - MATRIX TESTS, AUTOMATIC DEPRESSURIZATION SYSTEM TEST, PHASE B

TEST CATEGORY	TEST NO.	DESCRIPTION
Category 2 Matrix Tests	110	Saturated Steam from top of supply tank, Stage 1 open, ~2250 to 400 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	120	Saturated Steam from top of supply tank, Stages 1 and 2 open, ~800 to 100 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	130	Saturated Steam from top of supply tank, Stages 1 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	140	Saturated Steam from top of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	210	Saturated Water from bottom of supply tank, Stage 1 open, ~2250 to 400 psig, Maximum flow resistance simulated, 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	220	Saturated Water from bottom of supply tank, Stages 1 and 2 open, ~1200 to 100 psig, Maximum flow resistance simulated, 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	230	Saturated Water from bottom of supply tank, Stages 1 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated, 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	240	Saturated Water from bottom of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated, 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	250	Saturated Water from bottom of supply tank, Stage 2 open (inadvertent opening at full power), ~2235 psig, Maximum flow resistance simulated, 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	310	Saturated water from bottom of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Quench tank water initially at 212°F, Minimum flow resistance simulated, Maximum flow/minimum quality for max loads on sparger and quench tank.
	320	Saturated water from bottom of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Quench tank water at ambient, Minimum flow resistance simulated, Maximum flow/minimum quality for max loads on sparger and quench tank.
	330	Saturated water from bottom of supply tank, Stages 1 and 2 open, ~1200 to 100 psig, Quench tank water initially at 212°F, Minimum flow resistance simulated, Maximum flow/minimum quality for max loads on sparger and quench tank.
	340	Saturated water from bottom of supply tank, Stage 2 open, ~2235 psig, Quench tank water initially at 212°F, Minimum flow resistance simulated, Maximum flow/minimum quality for max loads on sparger and quench tank.

TABLE 5 - MATRIX TESTS, CORE MAKEUP TANK TEST

AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

TABLE 6 - MATRIX TESTS, LOW PRESSURE 1/4 HEIGHT INTEGRAL SYSTEMS TEST (OSU)

TEST CATEGORY	TEST NAME	DESCRIPTION
Cold Pre-Operational Tests	C01	Core makeup tank gravity drain
	C02	Accumulator tank drain
	C03	In-containment refueling water storage tank drain
	C04	Chemical and Volume Control System pump flow vs. pressure
	C05	Normal residual heat removal system pump flow vs. pressure
	C06	Steam generator feed flow versus pressure
	C07	ADS 1-3 Line Flow Test
	C08	ADS 4 Line Flow Test
	C09	RNS Injection Flow Test
Hot Pre-Operational Tests	HS01	Reactor Coolant Forced Circulation Loop Flow Test
	HS02	Reactor Coolant Natural Circulation Loop Flow Test
	HS03	Reactor Power Calorimetric
	HS04	Ambient Heat Loss Determination
	HS05	PRHR Loss Determination
	HS06	Steam Generator Performance Test
	HS07	Reactor Coolant System Heatup/Cooldown Test
Category 1 Matrix Tests	SB1	2-inch cold leg break, bottom of pipe, loop A with continuation into long term cooling mode
	SB4	2-inch cold leg break, bottom of pipe, loop A
	SB10	Double-ended guillotine break of cold leg balance line, vertical loop, loop A with continuation into long term cooling
	SB12	Double-ended guillotine break of direct vessel injection line
	SB13	2-inch break of direct vessel injection line
	SB14	Double-ended guillotine break of pressurizer/core makeup tank balance line, between check valve/core makeup tank, loop A, with continuation into long term cooling

Category 2 Matrix Tests	
LB01	Large CLB, Higher Decay Heat during long term cooling
SB3	2-inch cold leg break, top of pipe, loop A
SB5	1-inch cold leg break, bottom of pipe, loop A, with continuation into long term cooling
SB7	2-inch cold leg small break, bottom of pipe, loop A
SB9	2-inch break on cold leg balance line, vertical loop, loop A
SB11	Double-ended guillotine break of direct vessel injection line with continuation into long term cooling
SB14	Inadvertent ADS, stage 1 open, with continuation into long term cooling
SB15	2-inch hot leg break, bottom of pipe, loop A
SB19	CVT dP - Condensate to IRWST

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

TABLE 7 - MATRIX TESTS, FULL PRESSURE FULL HEIGHT INTEGRAL SYSTEMS TEST (SPES-2)

TEST CATEGORY	TEST NUMBER	DESCRIPTION
Cold Shakedown Tests	C-01	Single phase flow through the pressurizer surge line, 4 flow rates
	C-02A,B	Single phase flow through the pressurizer to core makeup tank balance lines, 4 flow rates per balance line
	C-03A,B	Single phase flow through the cold leg to core makeup tank balance lines, 4 flow rates per balance line
	C-04A,B	Core makeup tank draindown using cold leg to core makeup tank balance line
	C-05A,B	Core makeup tank gravity draindown using pressurizer to core makeup tank balance line
	C-06A,B	Safety Injection Accumulator blowdown
	C-07A,B	In-containment refueling water storage tank gravity draindown, three water levels
	C-08	Chemical and Volume Control System, Normal Residual Heat Removal System and Startup Feedwater System pump flow rate verification
	C-09	Operation of primary system with 2 reactor coolant pumps running
	C-10A,B	Operation of primary system with 1 reactor coolant pump running
	C-11	Facility volume measurement
Hot shakedown tests	H-01	Facility heated and heat at five constant temperatures
	H-02	Starting from nominal conditions, power will be shut off and steam generators isolated
	H-03	Facility operated at normal full pressure, temperature and power
	H-04	Facility transitioned from full power operating conditions to hot shutdown/natural circulation mode of operation
	H-05	Core makeup tank draindown using pressurizer to core makeup tank balance line
	H-06	Low pressure, safety system actuation using the automatic depressurization system with core makeup tank draindown and accumulator delivery
	H-07	Full power, full pressure, safety system actuation initiated by the opening of the first stage of the automatic depressurization system
Category 1 Matrix Tests	3	2-inch cold leg break with non-safety systems off
	1	1-inch cold leg break with non-safety systems off
	4	2-inch cold leg break with non-safety systems on
	5	2-inch direct vessel injection line break with non-safety systems off

6	Double ended guillotine break of the direct vessel injection line with non-safety systems off
7	2-inch break of cold leg to core makeup tank balance line with non-safety systems off
8	Double ended guillotine break of cold leg to core makeup tank balance line with non-safety systems off
9	Design basis steam generator tube rupture with non-safety systems on and operator action to isolate steam generator
10	Design basis steam generator tube rupture with non-safety systems on and no operator action
11	Beyond design basis steam generator tube rupture with non-safety systems on and no operator action
12	Large steamline break
Category 2 Matrix Tests	

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED T

	DESCRIPTION
TEST PROGRAM GENERAL	
0.1	Response to November 14, 1991 Request for Information Regarding AP600 Test Program
0.2	Response to January 15, 1992 Request for Information Regarding the AP600 Passive Containment Cooling System Tests
0.3	Responses to "AP600 Design Issues to be Resolved by High-Pressure, Full-Height Integral Testing"
0.4	Presentation Material from February 25, 1992 Westinghouse NRC Meeting on AP600 Testing
0.5	Response to November 14, 1991 Request for Additional Information Regarding AP600 Test Program
0.6	Presentation Material from March 3, 1992 ACRS Meeting on AP600 Testing
0.7	Presentation Material from June 1, 1992, AP600 Meeting on Integral Systems Testing
0.8	Presentation Material from June 23, 1992 AP600 ACRS Testing Presentation
0.9	NRC Request for Additional Information Regarding the AP600 Testing Program
0.10	AP600 Testing to Support Design Certification
0.11	AP600 Testing Schedule
0.12	Presentation Material from December 14, 1992 Westinghouse NRC Meeting on AP600 Testing
0.13	Westinghouse Response to NRC Request for Additional Information on the AP600 Testing Program dated July 21, 1992
0.14	Updated Testing Schedules for the AP600 Testing Program
0.15	Westinghouse Response to NRC Request for Additional Information on the AP600 Testing Program dated September 1, 1992
0.16	Test Schedule for AP600 Automatic Depressurization System Test - Phase B
0.17	Presentation Material from the March 9-10, 1993 Meeting on the AP600 Testing Program
0.18	Material in Support of March 23-24, 1993 Westinghouse/NRC Meeting on Containment Tests for AP600 (Test Spec additions, Test Matrix, Sch
0.19	Draft AP600 Test/Witness Matrix
0.20	Presentation Material from the March 23-24, 1993 Meeting on the AP600 Containment Test Program
0.21	Updated Testing Schedules for the AP600 Testing Program
0.22	Background Materials In Preparation for the July 22-23 Meeting of ACRS Subcommittee on T/H Phenomena
0.23	Presentation Materials from the June 18, 1993 Meeting on the AP600 Testing Program
0.24	AP600 Design and Design Certification Test Program Overview, Revision 2
0.25	General Outline for Quick Look Data Reports on AP600 Tests
0.26	AP600 Design and Design Certification Test Program Overview, Revision 3
0.27	Outline for AP600 Code Validation Process Steps Incorporating NRC Request for Single Blind Test Predictions
0.28	Presentation Materials from the December 10, 1993 Meeting on AP600 Test Program Issues
0.29	AP600 Design Certification Test Program Overview, Revision 4
0.30	AP600 Design Certification Program Schedule and Revision 5 of the AP600 Design Certification Test Program Overview
0.31	Additional Information in Support of Westinghouse Response to RAI 952.48 on the AP600 Design
0.32	Additional Information in Support of Westinghouse Response to RAI 952.43 on the AP600 Design
0.33	Additional Information in Support of Westinghouse Response to RAI 952.44-952.46 on the AP600 Design
0.34	Closure of AP600 Testing Program Issues

ION TEST PROGRAM OVERVIEW

	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	Yes	ET-NRC-91-3650, NPP-APSL-91-0286	12 16 91	Murley
	Yes	ET-NRC-91-3656, NPP-APSL-92-0013	1 22 92	Murley
	Yes	ET-NRC-92-3663, NSRA-APSL-92-0037	2 14 92	Crutchfield
	Yes	ET-NRC-92-3664, NSRA-APSL-92-0047	2 24 92	Murley
	No	ET-NRC-92-3666, NSRA-APSL-92-0046	2 24 92	Hasselberg
	Yes	ET-NRC-92-3671, NSRA-APSL-92-0053	3 4 92	Murley
	Yes	ET-NRC-92-3713, NSRA-APSL-92-0130	6 25 92	Murley
	Yes	ET-NRC-92-3716, NSRA-APSL-92-0133	6 30 92	Murley
	Yes	ET-NRC-92-3750, NSRA-APSL-92-0189	9 14 92	Murley
	No	ET-NRC-92-3754, NSRA-APSL-92-0200	10 5 92	Ward
	No	ET-NRC-92-3768, NSRA-APSL-92-0239	11 5 92	Murley
	Yes	ET-NRC-92-3783, NSRA-APSL-92-0264	12 14 92	Murley
	No	ET-NRC-93-3793, NSRA-APSL-93-0010	1 19 93	Murley
	No	ET-NRC-93-3800, NSRA-APSL-93-0011	1 19 93	Murley
	No	ET-NRC-93-3798, NSRA-APSL-93-0009	1 19 93	Murley
	No	ET-NRC-93-3811, NSRA-APSL-93-0026	2 2 93	Borchardt
	No	ET-NRC-93-3834, NSRA-APSL-93-0065	3 9 93	Borchardt
odule)	Yes	ET-NRC-93-3841, NSRA-APSL-93-0076	3 16 93	Borchardt
	No	ET-NRC-93-3848, NSRA-APSL-93-0093	3 23 93	Borchardt
	Yes	ET-NRC-93-3845, NSRA-APSL-93-0090	3 24 93	Borchardt
	No	ET-NRC-93-3855, NSRA-APSL-93-0109	4 13 93	Borchardt
	No	ET-NRC-93-3911, NSRA-APSL-93-0224	6 28 93	Boehnert
	No	ET-NRC-93-3910, NSRA-APSL-93-0223	6 28 93	Borchardt
	No	ET-NRC-93-3919, NSRA-APSL-93-0233	7 7 93	Borchardt
	No	ET-NRC-93-3946, NSRA-APSL-93-0305	8 16 93	Borchardt
	No	ET-NRC-93-3947, NSRA-APSL-93-0306	8 18 93	Borchardt
	No	ET-NRC-93-3976, NSRA-APSL-93-0360	9 27 93	Borchardt
	Yes	ET-NRC-93-4029, NSRA-APSL-93-0492	12 16 93	Borchardt
	No	NTD-NRC-94-4078, DCP/NRC0017	3 8 94	Borchardt
	No	NTD-NRC-94-4084, DCP/NRC0026	3 28 94	Borchardt
	Yes	NTD-NRC-94-4106, DCP/NRC0040	4 25 94	Borchardt
Also Available on Aperture Card	Yes	NTD-NRC-94-4108, DCP/NRC0042	4 29 94	Borchardt
	Yes	NTD-NRC-94-4114, DCP/NRC0048	4 29 94	Borchardt
	No	NTD-NRC-94-4117, DCP/NRC0051	5 3 94	Crutchfield

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- Chart 1 - Matrix Testing Schedules

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AP600 TEST PROGRAMS: TABLE 1 - TEST PROGRAM OVERVIEW (PART 1)					
Item No.	TEST DESCRIPTION	FACILITY LOCATION	SCALE	CATEGORY	TESTING STATUS
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN					
1	Air Flow Path Delta P Test	W Science & Technology Center - Churchill, PA	1:6 linear	Basic Research	Completed
2	Water Film Formation Test	W Science & Technology Center - Churchill, PA	N/A	Basic Research	Completed
3	Heated Plate Test	W Science & Technology Center - Churchill, PA	N/A	Basic Research	Completed
4	Bench Wind Tunnel Experiment	W Science & Technology Center - Churchill, PA	1:120 linear	Basic Research	Completed
5	Condensation Tests - Bare surface upward	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
6	Condensation Tests - Bare surface downward	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
7	Condensation Tests - Painted surface down	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
8	Condensation Tests - Light noncondensibles	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
9	Condensation Tests - Stagnation Flow Conditions	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
10	Condensation Tests - Stagnation/light noncondensibles	University of Wisconsin - Madison, WI	N/A	Basic Research	Completed
11	Condensation Tests - 2D condensation	University of Wisconsin - Madison, WI	N/A	Basic Research	In Progress
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION					
12	Integral (small scale) Tests - Phase 1 (Feasibility)	W Science & Technology Center - Churchill, PA	1:3 height 1:40 diameter	Safety Related	Completed
13	Integral (small scale) Tests - Phase 2A (Extension Tests)	W Science & Technology Center - Churchill, PA	1:3 height 1:40 diameter	Safety Related	Completed
14	Integral (small scale) Tests - Phase 2B (Continuation Tests)	W Science & Technology Center - Churchill, PA	1:3 height 1:40 diameter	Safety Related	Completed
15	1/8th Scale Heat Transfer Test - Phase 1 (Baseline)	W Science & Technology Center - Churchill, PA	~1:8 linear	Safety Related	Completed
16	1/8th Scale Heat Transfer Test - Phase 2 (Confirmatory)	W Science & Technology Center - Churchill, PA	~1:8 linear	Safety Related	Completed
17	Water Distribution System Test - Phase 1 (20ft Diameter)	W Waltz Mill Site - Madison, PA	1:1	Safety Related	Completed
18	Water Distribution System Test - Phase 2 (1/8th Sector)	W Waltz Mill Site - Madison, PA	1:1	Safety Related	Completed
19	Water Distribution System Test - Phase 3 (1/8th sector with selected distribution system)	W Waltz Mill Site - Madison, PA	1:1	Safety Related	Completed
20	Wind Tunnel Test - Phase 1	Univ. of Western Ontario - London, Ontario	~1:100 linear	Safety Related	Completed
21	Wind Tunnel Test - Phase 2	Univ. of Western Ontario - London, Ontario	~1:100 linear	Safety Related	Completed
22	Wind Tunnel Test - Phase 4A	CNRC Wind Tunnel - Ottawa, Canada	1:30 linear	Safety Related	Completed
23	Wind Tunnel Test Phase 4B	Univ. of Western Ontario - London, Ontario	1:500 linear	Safety Related	Completed

ION TEST PROGRAM OVERVIEW

TEST PURPOSE	ADDITIONAL INFORMATION OBTAINED (Optional)	Item No.
Obtain pressure drop data through the downcomer and annulus		1
Confirm wettability of coated steel surface		2
Confirm Passive Containment Cooling System heat transfer capability	<p>ANSTEC APERTURE CARD</p> <p>Also Available on Aperture Card</p>	3
Assess effects of wind on shield building design (inlet/outlet location)		4
Comparison with past separate effects tests		5
Obtain heat transfer coefficients with downward facing surfaces		6
Obtain the effect of AP600 paint on heat transfer performance		7
Obtain the effect of light noncondensibles on heat transfer performance		8
Obtain the heat transfer performance under stagnant flow conditions		9
Obtain the heat transfer performance under stagnant flow conditions in the presence of light noncondensibles		10
Measure condensation heat transfer coefficient using 2D test model	Investigate effect of non-condensibles on heat transfer coefficient and visualize flow field	11
Determine feasibility of water enhanced containment cooling system	Investigate external cooling impact from air velocity, air humidity, temperature and water film flow rates	12
Demonstrate operation of Passive Containment Cooling System (PCS) over increased range of operating conditions. Confirm PCS internal and external heat transfer capabilities (with 1:1 scale cooling air annulus at controlled air temperature & humidity)	Investigate effect of various annulus widths and uniform steam distributions. Obtain data on water film behavior on external surface over long vertical heat transfer surface.	13
Demonstrate operation of Passive Containment Cooling System with prototypic steam injection		14
Obtain heat transfer data for <u>WGOTHIC</u> computer code validation with minimal intervals		15
Obtain heat transfer data for <u>WGOTHIC</u> computer code validation	Investigate effect of non-condensibles on PCS heat removal capability and internal temperature distributions	16
Investigate performance of passive containment cooling system center water delivery/distribution device	Assess containment water coverage at top of dome	17
Measure containment water coverage using distribution system	Obtain film thickness measurements	18
Measure containment water coverage using selected design distribution system	Obtain film thickness measurements	19
Investigate wind sensitivity of shield building design	Assess effects of site structures on wind loading	20
Assess wind loads on containment baffle	Compare wind effects w & w/o internal flow path	21
Verify Phase 1 & 2 test results at higher Reynolds numbers	Confirm baffle tornado loads	22
Investigate site topography effects on air flow through PCS annulus	Investigate effects of large structures on air flow through PCS annulus	23

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AP600 TEST PROGRAMS: TABLE 1 - TEST PROGRAM OVERVIEW (PART 1)					
Item No.	TEST DESCRIPTION	FACILITY LOCATION	SCALE	CATEGORY	TESTING STATUS
PASSIVE CORE COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION					
24	PRHR Heat Exchanger Test - Phase 1	W Science & Technology Center - Churchill, PA	1:1 height	Safety Related	Completed
25	PRHR Heat Exchanger Test - Phase 2	W Science & Technology Center - Churchill, PA	1:1 height	Safety Related	Completed
26	Automatic Depressurization System Test - Phase A (sparger)	ENEA (VAPORE facility) - Casaccia, Italy	1:1	Safety Related	Completed
27	Automatic Depressurization Systems Test - Phase B	ENEA (VAPORE facility) - Casaccia, Italy	1:1	Safety Related	Planned
28	Core Makeup Tank Test	W Waltz Mill Site - Madison, PA	~1.8 diameter ~1.2 height	Safety Related	In Progress
29	DNBR Tests	Columbia University - New York, NY	1:1	Safety Related	Completed
30	Low Pressure 1/4 Height Integral Systems Tests	Oregon State University - Corvallis, OR	1:4 height 1:192 volume	Safety Related	Planned
31	Full Pressure Full Height Integral Systems Tests	SIET (SPES-2 Facility) - Piacenza, Italy	1:1 height 1:395 volume	Safety Related	In Progress

ION TEST PROGRAM OVERVIEW

TEST PURPOSE	ADDITIONAL INFORMATION OBTAINED (Optional)	Item No.
Determine thermal performance of the PRHR heat exchanger tubes.	Assess water mixing in the IRWST and the effects of mixing on heat transfer rates and steaming.	24
Expand the range of test conditions to more fully define a PRHR heat transfer correlation.	Determine the impact of lower initial tank water level on steaming.	25
Obtain sparger performance data, measure loads imposed on quench tank for use in confirming IRWST design.	Obtain thermal hydraulic data for computer code validation.	26
Obtain thermal-hydraulic data for computer code validation	Piping, structure loads/responses with both 1φ and 2φ flow	27
Obtain thermal-hydraulic data for computer code validation	Confirm adequacy of CMT level instrumentation	28
Obtain DNB data at low flow conditions.	Obtain data on fuel assembly flow mixing grids at design flow conditions.	29
Obtain thermal-hydraulic data for computer code validation	Investigate long term cooling behavior	30
Obtain thermal-hydraulic data for computer code validation	Investigate systems interactions during high pressure transients	31

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AP600 TEST PROGRAMS: TABLE 2 - TEST PROGRAM OVERVIEW (PART 2)						
Item No.	TEST NAME	TEST SCHEDULE				
		Start	End	SCHEDULE		
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN						
1	Air Flow Path Delta P Test	January 1988	February 1988	Completed		N/A
2	Water Film Formation Test	February 1988	March 1988	Completed		N/A
3	Heated Plate Test	April 1988	June 1988	Completed		N/A
4	Bench Wind Tunnel Experiment	August 1988	September 1988	Completed		N/A
5	Condensation Tests - Bare surface upward	September 1988	December 1988	Completed		N/A
6	Condensation Tests - Bare surface downward	September 1989	December 1989	Completed		N/A
7	Condensation Tests - Painted surface downward	September 1990	December 1990	Completed		N/A
8	Condensation Tests - Light noncondensibles	September 1991	December 1991	Completed		N/A
9	Condensation Tests - Stagnation flow conditions	September 1992	March 1993	Completed		N/A
10	Condensation Tests - Stagnation/Light noncondensibles	March 1993	July 1993	Completed		N/A
11	Condensation Tests - 2D Condensation	January 1994	June 1994	In Progress		N/A
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION						
12	Integral (small scale) Tests - Phase 1 (Feasibility)	May 1989	October 1989	Completed		N/A
13	Integral (small scale) Tests - Phase 2A (Extension Tests)	January 1990	June 1990	Completed		N/A
14	Integral (small scale) Tests - Phase 2B (Continuation Tests)	June 1992	August 1992	Completed		N/A
15	1/8th Scale Heat Transfer Test - Phase 1 (Baseline)	February 1992	June 1992	Completed		N/A
16	1/8th Scale Heat Transfer Test - Phase 2 (Confirmatory)	June 1993	September 1993	Completed		N/A
17	Water Distribution System Test - Phase 1 (20ft Diameter)	June 1991	August 1991	Completed		N/A
18	Water Distribution System Test - Phase 2 (1/8th Sector)	September 1991	February 1992	Completed		N/A
19	Water Distribution System Test - Phase 3	September 1993	September 1993	Completed		N/A
20	Wind Tunnel Test - Phase 1	June 1991	August 1991	Completed		N/A
21	Wind Tunnel Test - Phase 2	February 1992	March 1992	Completed		N/A
22	Wind Tunnel Test - Phase 4A	June 1993	August 1993	Completed		N/A
23	Wind Tunnel Test Phase 4B	September 1993	September 1993	Completed		N/A
PASSIVE CORE COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION						
24	PRHR Heat Exchanger Test - Phase 1	November 1989	January 1990	Completed		N/A
25	PRHR Heat Exchanger Test - Phase 2	July 1990	November 1990	Completed		N/A
26	Automatic Depressurization System Test - Phase A (sparger)	June 1992	November 1992	Completed		N/A
27	Automatic Depressurization Systems Test - Phase B	July 1994	November 1994	Chart 1		Table 4
28	Core Makeup Tank Test	February 1994	August 1994	Chart 1		Table 5
29	DNBR Tests	June 1993	February 1994	Completed		N/A
30	Low Pressure 1/4 Height Integral Systems Tests	July 1994	February 1995	Chart 1		Table 6
31	Full Pressure Full Height Integral Systems Tests	February 1994	November 1994	Chart 1		Table 7

ION TEST PROGRAM OVERVIEW

NRC WITNESS OF KEY TESTS				Item No.
MATRIX	TEST NAME/NO.	DESCRIPTION	WEEK OF	
	N/A	N/A	N/A	1
	N/A	N/A	N/A	2
	N/A	N/A	N/A	3
	N/A	N/A	N/A	4
	N/A	N/A	N/A	5
	N/A	N/A	N/A	6
	N/A	N/A	N/A	7
	N/A	N/A	N/A	8
	N/A	N/A	N/A	9
	N/A	N/A	N/A	10
	N/A	N/A	N/A	11
	N/A	N/A	N/A	12
	N/A	N/A	N/A	13
	N/A	N/A	N/A	14
	N/A	N/A	N/A	15
	N/A	N/A	N/A	16
	N/A	N/A	N/A	17
	N/A	N/A	N/A	18
	N/A	N/A	N/A	19
	N/A	N/A	N/A	20
	N/A	N/A	N/A	21
	N/A	N/A	N/A	22
	N/A	N/A	N/A	23
	N/A	N/A	N/A	24
	N/A	N/A	N/A	25
	N/A	N/A	N/A	26
	210	Saturated water blowdown from 2250 psig, maximum flow resistance	9/7/94	27
	403	Hot CMT draindown during depressurization	8/8/94	28
	N/A	N/A	N/A	29
	SB12	SBLOCA - DEG DVI line break	8/17/94	30
	1 11	SBLOCA - .1in. Cold Leg Break Steam Generator Tube Rupture	5/7/94 11/2/94	31

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AP600 TEST PROGRAMS: TABLE 3 - TEST PROGRAM OVERVIEW (PART 3)

Item No.	TEST DESCRIPTION	REVIEW MEETINGS				
			Test Matrix	Scaling Report	Test Specification	Operating Procedure
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN						
1	Air Flow Path Delta P Test	-	N/A	N/A	N/A	N/A
2	Water Film Formation Test	-	N/A	N/A	N/A	N/A
3	Heated Plate Test	-	N/A	N/A	N/A	N/A
4	Bench Wind Tunnel Experiment	-	N/A	N/A	N/A	N/A
5	Condensation Tests - Bare surface upward	-	Reference 5.3	N/A	N/A	N/A
6	Condensation Tests - Bare surface downward	-	Reference 6.3	N/A	N/A	N/A
7	Condensation Tests - Painted surface downward	-	WCAP-13307	N/A	N/A	N/A
8	Condensation Tests - Light noncondensibles	-	Reference 8.2	N/A	N/A	N/A
9	Condensation Tests - Stagnation flow conditions	-	Reference 9.2	N/A	N/A	N/A
10	Condensation Tests - Stagnation/light noncondensibles	-	Reference 10.2	N/A	N/A	N/A
11	Condensation Tests - 2D condensation	-	8/94	N/A	N/A	N/A
PASSIVE CONTAINMENT COOLING SYSTEM TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION						
12	Integral (small scale) Tests - Phase 1 (Feasibility)	-	WCAP-12667, Rev 1	N/A	N/A	Completed
13	Integral (small scale) Tests - Phase 2A (Extension Tests)	-	Presentation Mat'l from 3/17/92 meeting w/ NRC	N/A	WCAP-13315	Completed
14	Integral (small scale) Tests - Phase 2B (Continuation Tests)	-	Presentation Mat'l from 3/17/92 meeting w/ NRC	N/A	WCAP-13315	Completed
15	1/8th Scale Heat Transfer Test - Phase 1 (Baseline)	-	WCAP-13566	WCAP-13246	WCAP-13267	Completed
16	1/8th Scale Heat Transfer Test - Phase 2 (Confirmatory)	3/23-24/93 2/23-24/94	W Letter ET-NRC-93-3845	WCAP-13246	WCAP-13267	Completed
17	Water Distribution System Test - Phase 1 (20ft Diameter)	-	WCAP-13290	N/A	WCAP-13290	Completed
18	Water Distribution System Test - Phase 2 (1/8th Sector)	-	WCAP-13290	N/A	WCAP-13290	Completed
19	Water Distribution System Test - Phase 3	-	WCAP-13816	N/A	WCAP-13816	Completed
20	Wind Tunnel Test - Phase 1	-	WCAP-13294	WCAP-13294	WCAP-13318	Completed
21	Wind Tunnel Test - Phase 2	-	WCAP-13323	WCAP-13323 WCAP-13294	WCAP-13318	Completed
22	Wind Tunnel Test - Phase 4A	-	WCAP-13756	5/94	WCAP-13318	Completed
23	Wind Tunnel Test Phase 4B	-	WCAP-14005	7/94	WCAP-13318	Completed

ION TEST PROGRAM OVERVIEW

TEST DOCUMENTS					Item No.
Procedures *	Facility Description Report	Quick Look Reports	Final Test Report	Other Relevant Information	
* - FACILITY OPERATING PROCEDURES ARE MAINTAINED IN WESTINGHOUSE FILES AND ARE AVAILABLE FOR REVIEW.					
	WCAP-13328	N/A	WCAP-13328	WCAP-13330	1
	WCAP-13884	N/A	WCAP-13884	WCAP-13330	2
	WCAP-12665	N/A	WCAP-12665	WCAP-13330, WCAP-13246	3
	WCAP-14048	N/A	WCAP-14048	WCAP-13330	4
	Reference 5.3	N/A	Reference 5.3	WCAP-13246	5
	Reference 6.3	N/A	Reference 6.3	WCAP-13246	6
	WCAP-13307	N/A	WCAP-13307	WCAP-13246	7
	Reference 8.2	N/A	Reference 8.2	ANSTEC APERTURE CARD	8
	Reference 9.2	N/A	Reference 9.2		9
	Reference 10.2	None	Reference 10.2		Also Available on Aperture Card
	8/94	None	8/94		11
	WCAP-12667, Rev. 1	N/A	WCAP-12667, Rev 1	WCAP-13330, WCAP-13246	12
	8/94	None	8/94	WCAP-13246	13
	8/94	None	8/94	WCAP-13246	14
	8/94	None	WCAP-13566	WCAP-13725, WCAP-13246	15
	8/94	11/93-5/94	8/94	WCAP-13566	16
	WCAP-13292	None	WCAP-13353	WCAP-13246	17
	WCAP-13292	None	WCAP-13296	WCAP-13246	18
	WCAP-13292	None	WCAP-13960	WCAP-13353, WCAP-13296	19
	WCAP-13294	None	WCAP-13294	WCAP-13246	20
	WCAP-13323	None	WCAP-13323	WCAP-13294, WCAP-13246	21
	5/94	None	5/94	WCAP-13294, WCAP-13323	22
	7/94	None	7/94	WCAP-13294, WCAP-13323	23

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AP600 TEST PROGRAMS: TABLE 3 - TEST PROGRAM OVERVIEW (PART 3)						
Item No.	TEST DESCRIPTION	REVIEW MEETINGS				
			Test Matrix	Scaling Report	Test Specification	Operating Pr
PASSIVE SAFETY SYSTEMS TESTS IN SUPPORT OF AP600 DESIGN CERTIFICATION						* -FACILITY OPERAT
24	PRHR Heat Exchanger Test - Phase 1	-	WCAP-12666	N/A	N/A	Completed
25	PRHR Heat Exchanger Test - Phase 2	-	WCAP-12980	N/A	WCAP-13368	Completed
26	Automatic Depressurization System Test - Phase A (Sparger)	5/26-27/93	WCAP-13342	N/A	WCAP-13342	Completed
27	Automatic Depressurization Systems Test - Phase B	5/26-27/93 2/25/94	Table 4	N/A	WCAP-13342 To be revised 6/94	6/94
28	Core Makeup Tank Test	2/25/93 3/14/94	Table 5	WCAP-13963	WCAP-13345, R2 To be revised 5/94	Series 100-30 Series 400-50
29	DNBR Tests	-	N/A	N/A	WCAP-12488	Completed
30	Low Pressure 1/4 Height Integral Systems Tests	12/9/92 9/20-21/93	Table 6	5/94	WCAP-13234	4/94-6/94
31	Full Pressure Full Height Integral Systems Tests	12/10/92	Table 7	WCAP-13277	WCAP-14053	12/93 - 5/94

ION TEST PROGRAM OVERVIEW

TEST DOCUMENTS					Item No.
Procedures *	Facility Description Report	Quick Look Reports	Final Test Report	Other Relevant Information	
TESTING PROCEDURES ARE MAINTAINED IN WESTINGHOUSE FILES AND ARE AVAILABLE FOR REVIEW					
	WCAP-12666	N/A	WCAP-12666		24
	WCAP-12980	N/A	WCAP-12980		25
	5/94	N/A	6/94		26
	3/95	None	3/95		27
10 Complete 10 6/94	5/94	5/94-9/94	11/94		28
	8/94	None	8/94		29
	6/94	8/94-4/95	6/95		30
	5/94	5/94-12/94	3/95		31

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

TABLE 4 - MATRIX TESTS, AUTOMATIC DEPRESSURIZATION SYSTEM TEST, PHASE B

TEST CATEGORY	TEST NO.	DESCRIPTION
Category 2 Matrix Tests	110	Saturated Steam from top of supply tank, Stage 1 open, ~2250 to 400 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	120	Saturated Steam from top of supply tank, Stages 1 and 2 open, ~800 to 100 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	130	Saturated Steam from top of supply tank, Stages 1 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	140	Saturated Steam from top of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated, Obtain single phase T/H data
	210	Saturated Water from bottom of supply tank, Stage 1 open, ~2250 to 400 psig, Maximum flow resistance simulated, Obtain single phase T/H data obtain a range of two-phase T/H data.
	220	Saturated Water from bottom of supply tank, Stages 1 and 2 open, ~1200 to 100 psig, Maximum flow resistance simulated. 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	230	Saturated Water from bottom of supply tank, Stages 1 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated. 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	240	Saturated Water from bottom of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Maximum flow resistance simulated. 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	250	Saturated Water from bottom of supply tank, Stage 2 open (inadvertent opening at full power), ~2235 psig, Maximum flow resistance simulated. 12-inch gate valve positioned to obtain a range of two-phase T/H data.
	310	Saturated water from bottom of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Quench tank water initially at 212°F, Minimum flow resistance simulated. Maximum flow/minimum quality for max loads on sparger and quench tank.
	320	Saturated water from bottom of supply tank, Stages 1, 2 and 3 open, ~500 to 50 psig, Quench tank water at ambient, Minimum flow resistance simulated. Maximum flow/minimum quality for max loads on sparger and quench tank.
	330	Saturated water from bottom of supply tank, Stages 1 and 2 open, ~1200 to 100 psig, Quench tank water initially at 212°F, Minimum flow resistance simulated. Maximum flow/minimum quality for max loads on sparger and quench tank.
	340	Saturated water from bottom of supply tank, Stage 2 open, ~2235 psig, Quench tank water initially at 212°F, Minimum flow resistance simulated. Maximum flow/minimum quality for max loads on sparger and quench tank.

TABLE 5 - MATRIX TESTS, CORE MAKEUP TANK TEST

TEST CATEGORY	TEST NO.	TEST TYPE	CMT DRAIN RATE	STEAM SUPPLY PRESSURE(S), PSIG	COMMENTS	
Category 1 Matrix Tests	101-105	CMT wall condensation with and without noncondensable gases	N/A. CMT drain rate based on steam condensation rate and drain capability	10/135/585/1085/2235, with subsequent depressurization	CMT initially contains no water, and is evacuated (no air).	
	106-108			10	CMT initially evacuated and then pressurized with air (or N ₂) to 236, 1.13 and 2.13 psia, respectively.	
	109-111			1085	CMT initially evacuated and then pressurized with helium to 42, 146, and 296 psia, respectively.	
	201-208	CMT Wall and Water Surface Condensation	N/A - CMT level fixed. Water drained from CMT via external path to match steam condensation	10/135/1085/2235, with subsequent depressurization	CMT initially 90% and 75% full, CMT level control used to maintain fixed CMT level.	
	209-214			10/135/1085, with subsequent depressurization	CMT initially 50% and 25% full, CMT level control used to maintain fixed CMT level.	
	301-312	CMT draindown at constant pressure	6/11/16/Max	10/135/1085	Low resistance steam supply line no. 2 utilized; drain rate controlled by discharge line resistance.	
	313-316		Flow rate controlled by steam supply line no. 1 resistance. (3 ft/gpm ²).	1085/2235	Low resistance steam supply line no. 2 utilized; drain rate controlled by discharge line resistance.	
	Category 2 Matrix Tests	401-402	CMT draindown during depressurization	Discharge line resistance for 6/16 gpm	1985 followed by depressurization to 20	Low resistance steam supply line no. 2 utilized; drain rate controlled by discharge line resistance.
		403-404			2235 followed by depressurization to 20	Discharge line resistance set to provide 6/16 gpm gravity drain rate at atmospheric pressure.
		501-502	Natural circulation followed by draindown and depressurization	Discharge line resistance set for 6/16 gpm drain rate	1085 followed by depressurization to 20	Steam supply line no. 1 is closed. Reservoir water level at "HI" level. Reservoir water temperature initially 545°F. Steam supply line no. 2 is opened to initiate natural circulation until one-fifth of CMT heated. Reservoir water level is reduced to initiate draindown. The steam supply is isolated and the water/steam reservoir is vented when the CMT is drained to 97 inches.
503-504					Repeat with natural circulation until one-half of CMT heated.	
505-506					Repeat with natural circulation until CMT is completely heated.	
507 NEW					Repeat with natural circulation until one-fifth of CMT is heated.	
508 NEW					Repeat with natural circulation until one-half of CMT is heated.	
509 NEW			Repeat with natural circulation until CMT is completely heated.			
601-606		CMT actuation with both steam lines, with and without noncondensable gas.	Discharge line resistance set for 6/16 gpm. Steam supply line no. 1 resistance set to be 2 ft/gpm ² .	1825 - constant	Reservoir water level "HI". Reservoir water temperature initially 545°F. Steam supply line no. 1 is open. Both steam supply line no. 2 and CMT discharge lines opened simultaneously. Performed with steam, and with 146 and 296 psig of He initially in CMT side of steam supply line no. 2.	
607-612				1085 - constant		

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

TABLE 6 - MATRIX TESTS, LOW PRESSURE 1/4 HEIGHT INTEGRAL SYSTEMS TEST (OSU)

TEST CATEGORY	TEST NAME	DESCRIPTION
Cold Pre-Operational Tests	C01	Core makeup tank gravity drain
	C02	Accumulator tank drain
	C03	In-containment refueling water storage tank drain
	C04	Chemical and Volume Control System pump flow vs. pressure
	C05	Normal residual heat removal system pump flow vs. pressure
	C06	Steam generator feed flow versus pressure
	C07	ADS 1-3 Line Flow Test
	C08	ADS 4 Line Flow Test
	C09	RNS Injection Flow Test
Hot Pre-Operational Tests	HS01	Reactor Coolant Forced Circulation Loop Flow Test
	HS02	Reactor Coolant Natural Circulation Loop Flow Test
	HS03	Reactor Power Calorimetric
	HS04	Ambient Heat Loss Determination
	HS05	PRHR Loss Determination
	HS06	Steam Generator Performance Test
	HS07	Reactor Coolant System Heatup/Cooldown Test
Category 1 Matrix Tests	SB1	2-inch cold leg break, bottom of pipe, loop A with continuation into long-term cooling mode
	SB4	2-inch cold leg break, bottom of pipe, loop A
	SB10	Double-ended guillotine break of cold leg balance line, vertical loop, loop A with continuation into long term cooling
	SB12	Double-ended guillotine break of direct vessel injection line
	SB13	2-inch break of direct vessel injection line
	SB16	Double-ended guillotine break of pressurizer/core makeup tank balance line, between check valve/core makeup tank, loop A, with continuation into long-term cooling

Category 2 Matrix Tests	
LB01	Large CLB, Higher Decay Heat during long term cooling
SB3	2-inch cold leg break, top of pipe, loop A
SB5	1-inch cold leg break, bottom of pipe, loop A, with continuation into long term cooling
SB7	2-inch cold leg small break, bottom of pipe, loop A
SB9	2-inch break on cold leg balance line, vertical loop, loop A
SB11	Double-ended guillotine break of direct vessel injection line with continuation into long term cooling
SB14	Inadvertent ADS, stage 1 open, with continuation into long term cooling
SB15	2-inch hot leg break, bottom of pipe, loop A
SB19	CVT dP - Condensate to IRWST

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

TABLE 7 - MATRIX TESTS, FULL PRESSURE FULL HEIGHT INTEGRAL SYSTEMS TEST (SPES-2)

TEST CATEGORY	TEST NUMBER	DESCRIPTION
Cold Shakedown Tests	C-01	Single phase flow through the pressurizer surge line, 4 flow rates
	C-02A,B	Single phase flow through the pressurizer to core makeup tank balance lines, 4 flow rates per balance line
	C-03A,B	Single phase flow through the cold leg to core makeup tank balance lines, 4 flow rates per balance line
	C-04A,B	Core makeup tank draindown using cold leg to core makeup tank balance line
	C-05A,B	Core makeup tank gravity draindown using pressurizer to core makeup tank balance line
	C-06A,B	Safety Injection Accumulator blowdown
	C-07A,B	In-containment refueling water storage tank gravity draindown, three water levels
	C-08	Chemical and Volume Control System, Normal Residual Heat Removal System and Startup Feedwater System pump flow rate verification
	C-09	Operation of primary system with 2 reactor coolant pumps running
	C-10A,B	Operation of primary system with 1 reactor coolant pump running
	C-11	Facility volume measurement
Hot shakedown tests	H-01	Facility heated and heat at five constant temperatures
	H-02	Starting from nominal conditions, power will be shut off and steam generators isolated
	H-03	Facility operated at normal full pressure, temperature and power
	H-04	Facility transitioned from full power operating conditions to hot shutdown/natural circulation mode of operation
	H-05	Core makeup tank draindown using pressurizer to core makeup tank balance line
	H-06	Low pressure, safety system actuation using the automatic depressurization system with core makeup tank draindown and accumulator delivery
	H-07	Full power, full pressure, safety system actuation initiated by the opening of the first stage of the automatic depressurization system
Category 1 Matrix Tests	3	2-inch cold leg break with non-safety systems off
	1	1-inch cold leg break with non-safety systems off
	4	2-inch cold leg break with non-safety systems on
	5	2-inch direct vessel injection line break with non-safety systems off

6	Double ended guillotine break of the direct vessel injection line with non-safety systems off
7	2-inch break of cold leg to core makeup tank balance line with non-safety systems off
8	Double ended guillotine break of cold leg to core makeup tank balance line with non-safety systems off
9	Design basis steam generator tube rupture with non-safety systems on and operator action to isolate steam generator
10	Design basis steam generator tube rupture with non-safety systems on and no operator action
11	Beyond design basis steam generator tube rupture with non-safety systems on and no operator action
12	Large steamline break
Category 2 Matrix Tests	

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED T

	DESCRIPTION
TEST PROGRAM GENERAL	
0.1	Response to November 14, 1991 Request for Information Regarding AP600 Test Program
0.2	Response to January 15, 1992 Request for information Regarding the AP600 Passive Containment Cooling System Tests
0.3	Responses to "AP600 Design Issues to be Resolved by High-Pressure, Full-Height Integral Testing"
0.4	Presentation Material from February 25, 1992 Westinghouse NRC Meeting on AP600 Testing
0.5	Response to November 14, 1991 Request for Additional Information Regarding AP600 Test Program
0.6	Presentation Material from March 3, 1992 ACRS Meeting on AP600 Testing
0.7	Presentation Material from June 1, 1992, AP600 Meeting on Integral Systems Testing
0.8	Presentation Material from June 23, 1992 AP600 ACRS Testing Presentation
0.9	NRC Request for Additional Information Regarding the AP600 Testing Program
0.10	AP600 Testing to Support Design Certification
0.11	AP600 Testing Schedule
0.12	Presentation Material from December 14, 1992 Westinghouse NRC Meeting on AP600 Testing
0.13	Westinghouse Response to NRC Request for Additional Information on the AP600 Testing Program dated July 21, 1992
0.14	Updated Testing Schedules for the AP600 Testing Program
0.15	Westinghouse Response to NRC Request for Additional Information on the AP600 Testing Program dated September 1, 1992
0.16	Test Schedule for AP600 Automatic Depressurization System Test - Phase B
0.17	Presentation Material from the March 9-10, 1993 Meeting on the AP600 Testing Program
0.18	Material in Support of March 23-24, 1993 Westinghouse/NRC Meeting on Containment Tests for AP600 (Test Spec additions, Test Matrix, Sch
0.19	Draft AP600 Test/Witness Matrix
0.20	Presentation Material from the March 23-24, 1993 Meeting on the AP600 Containment Test Program
0.21	Updated Testing Schedules for the AP600 Testing Program
0.22	Background Materials In Preparation for the July 22-23 Meeting of ACRS Subcommittee on T/H Phenomena
0.23	Presentation Materials from the June 18, 1993 Meeting on the AP600 Testing Program
0.24	AP600 Design and Design Certification Test Program Overview, Revision 2
0.25	General Outline for Quick Look Data Reports on AP600 Tests
0.26	AP600 Design and Design Certification Test Program Overview, Revision 3
0.27	Outline for AP600 Code Validation Process Steps Incorporating NRC Request for Single Blind Test Predictions
0.28	Presentation Materials from the December 10, 1993 Meeting on AP600 Test Program Issues
0.29	AP600 Design Certification Test Program Overview, Revision 4
0.30	AP600 Design Certification Program Schedule and Revision 5 of the AP600 Design Certification Test Program Overview
0.31	Additional Information in Support of Westinghouse Response to RAI 952.48 on the AP600 Design
0.32	Additional Information in Support of Westinghouse Response to RAI 952.43 on the AP600 Design
0.33	Additional Information in Support of Westinghouse Response to RAI 952.44-952.46 on the AP600 Design
0.34	Closure of AP600 Testing Program Issues

ION TEST PROGRAM OVERVIEW

	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	Yes	ET-NRC-91-3650, NPP-APSL-91-0286	12 16 91	Murley
	Yes	ET-NRC-91-3656, NPP-APSL-92-0013	1 22 92	Murley
	Yes	ET-NRC-92-3663, NSRA-APSL-92-0037	2 14 92	Crutchfield
	Yes	ET-NRC-92-3664, NSRA-APSL-92-0047	2 24 92	Murley
	No	ET-NRC-92-3666, NSRA-APSL-92-0046	2 24 92	Hasselberg
	Yes	ET-NRC-92-3671, NSRA-APSL-92-0053	3 4 92	Murley
	Yes	ET-NRC-92-3713, NSRA-APSL-92-0130	6 25 92	Murley
	Yes	ET-NRC-92-3716, NSRA-APSL-92-0133	6 30 92	Murley
	Yes	ET-NRC-92-3750, NSRA-APSL-92-0189	9 14 92	Murley
	No	ET-NRC-92-3754, NSRA-APSL-92-0200	10 5 92	Ward
	No	ET-NRC-92-3768, NSRA-APSL-92-0239	11 5 92	Murley
	Yes	ET-NRC-92-3783, NSRA-APSL-92-0264	12 14 92	Murley
	No	ET-NRC-93-3799, NSRA-APSL-93-0010	1 19 93	Murley
	No	ET-NRC-93-3800, NSRA-APSL-93-0011	1 19 93	Murley
	No	ET-NRC-93-3798, NSRA-APSL-93-0009	1 19 93	Murley
	No	ET-NRC-93-3811, NSRA-APSL-93-0026	2 2 93	Borchardt
	No	ET-NRC-93-3834, NSRA-APSL-93-0065	3 9 93	Borchardt
odule)	Yes	ET-NRC-93-3841, NSRA-APSL-93-0076	3 16 93	Borchardt
	No	ET-NRC-93-3848, NSRA-APSL-93-0093	3 23 93	Borchardt
	Yes	ET-NRC-93-3845, NSRA-APSL-93-0090	3 24 93	Borchardt
	No	ET-NRC-93-3855, NSRA-APSL-93-0109	4 13 93	Borchardt
	No	ET-NRC-93-3911, NSRA-APSL-93-0224	6 28 93	Boehnert
	No	ET-NRC-93-3910, NSRA-APSL-93-0223	6 28 93	Borchardt
	No	ET-NRC-93-3919, NSRA-APSL-93-0233	7 7 93	Borchardt
	No	ET-NRC-93-3946, NSRA-APSL-93-0305	8 16 93	Borchardt
	No	ET-NRC-93-3947, NSRA-APSL-93-0306	8 18 93	Borchardt
	No	ET-NRC-93-3976, NSRA-APSL-93-0360	9 27 93	Borchardt
	Yes	ET-NRC-93-4029, NSRA-APSL-93-0492	12 16 93	Borchardt
	No	NTD-NRC-94-4078, DCP/NRC0017	3 8 94	Borchardt
	No	NTD-NRC-94-4084, DCP/NRC0026	3 28 94	Borchardt
	Yes	NTD-NRC-94-4106, DCP/NRC0040	4 25 94	Borchardt
	Yes	NTD-NRC-94-4108, DCP/NRC0042	4 29 94	Borchardt
	Yes	NTD-NRC-94-4114, DCP/NRC0048	4 29 94	Borchardt
	No	NTD-NRC-94-4117, DCP/NRC0051	5 3 94	Crutchfield

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TABLE B - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO THE AP600 DESIGN CERTIFICATE)

	DESCRIPTION
1. Air Flow Delta P Test	
1.1	WCAP-13328, "Tests of Air Flow for Cooling the AP600 Reactor Containment, Rev. 0"
1.2	WCAP-13329, "Tests of Air Flow for Cooling the AP600 Reactor Containment, Rev. 0"
1.3	WCAP-13330, "Natural Convection Cooling of AP600 Containment, Rev. 0"
1.4	WCAP-13331, "Natural Convection Cooling of AP600 Containment, Rev. 0"
2. Water Film Formation Test	
2.1	WCAP-13330, "Natural Convection Cooling of AP600 Containment, Rev. 0"
2.2	WCAP-13331, "Natural Convection Cooling of AP600 Containment, Rev. 0"
2.3	WCAP-13884, "Water Film Formation on AP600 Reactor Containment Surface", Revision 0
2.4	WCAP-13885, "Water Film Formation on AP600 Reactor Containment Surface", Revision 0
3. Heated Plate Test	
3.1	WCAP-12665, "Test of Heat Transfer and Water Film Evaporation on a Heated Plate Simulating Cooling of the AP600 Reactor Containment"
3.2	WCAP-12665, "Tests of Heat Transfer and Water Film Evaporation on a Heated Plate Simulating Cooling of the AP600 Reactor Containment"
3.3	WCAP-13341, "Tests of Heat Transfer and Water Film Evaporation on a Heated Plate Simulating Cooling of the AP600 Reactor Containment"
3.4	WCAP-13330, "Natural Convection Cooling of AP600 Containment, Rev. 0"
3.5	WCAP-13331, "Natural Convection Cooling of AP600 Containment, Rev. 0"
3.6	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"
3.7	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"
4. Bench Wind Tunnel Experiment	
4.1	WCAP-13330, "Natural Convection Cooling of AP600 Containment, Rev. 0"
4.2	WCAP-13331, "Natural Convection Cooling of AP600 Containment, Rev. 0"
4.3	WCAP-14048, "Passive Containment Cooling System Bench Scale Wind Tunnel Test"
5. Condensation Tests - Bare Surface Upward	
5.1	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"
5.2	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"
5.3	References for Basic Research Tests on Condensation Performed in Support of the AP600 Design
5.4	J.J. Barry, "Effects of Interfacial Structures on Film Condensation," PhD Thesis (1987)
6. Condensation Tests - Bare Surface Downward	
6.1	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"
6.2	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"
6.3	References for Basic Research Tests on Condensation Performed in Support of the AP600 Design
7. Condensation Tests - Painted Surface Downward	
7.1	WCAP-13307, "Condensation in the Presence Of A Noncondensable Gas - Experimental Investigation"
7.2	WCAP-13308, "Condensation in the Presence Of A Noncondensable Gas - Experimental Investigation"
7.3	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"
7.4	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Auxiliary Buildings"

ION TEST PROGRAM OVERVIEW

PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Yes	NTD-NRC-94-4056, DCP/NRC0002	2 2 94	Borchardt
No	NTD-NRC-94-4056, DCP/NRC0002	2 2 94	Borchardt
Yes	NS-NRC-90-3525, NPAP-APSL-90-0048	7 16 90	Donatelli
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Yes	ET-NRC-92-3726	7 31 92	Murley
No	ET-NRC-92-3726	7 31 92	Murley
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	NTD-NRC-94-4116, DCP/NRC0050	4 29 94	Borchardt
Yes	ET-NRC-92-3726	7 31 92	Murley
No	ET-NRC-92-3726	7 31 92	Murley
No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
Yes	ET-NRC-92-3726	7 31 92	Murley
No	ET-NRC-92-3726	7 31 92	Murley
No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
No	ET-NRC-92-3726	7 31 92	Murley
Yes	ET-NRC-92-3726	7 31 92	Murley

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED)

	DESCRIPTION
8. Condensation Tests - Light Noncondensibles	
8.1	References for Basic Research Tests on Condensation Performed in Support of the AP600 Design
8.2	A. P. Pemsteiner, "Condensation in the Presence of Noncondensable Gas: Effect of Helium Concentration," 1993, University of Wisconsin The
8.3	I. K. Huhtiniemi, "Condensation in the Presence of Noncondensable Gas: The Effect of Surface Orientation," Prelim Thesis (1990)
8.4	I. K. Huhtiniemi, "Condensation in the Presence of Noncondensable Gas: The Effect of Surface Orietation," Prelim Thesis (1990)
9. Condensation Tests - Stagnation Flow Conditions	
9.1	References for Basic Research Tests on Condensation Performed in Support of the AP600 Design
9.2	A. P. Pemsteiner, "Condensation in the Presence of Noncondensable Gas: Effect of Helium Concentration," 1993, University of Wisconsin The
10. Condensation Tests - Stagnation/Light Noncondensibles	
10.1	References for Basic Research Tests on Condensation Performed in Support of the AP600 Design
10.2	A. P. Pemsteiner, "Condensation in the Presence of Noncondensable Gas: Effect of Helium Concentration," 1993, University of Wisconsin The
11. Condensation Tests - 2D Condensation	
11.1	References for Basic Research Tests on Condensation Performed in Support of the AP600 Design
12. Integral (small scale) Tests - Phase 1 (Feasibility)	
12.1	WCAP-12667, "Test of Heat Transfer and Water Film Evaporation From a Simulated Containment To Demonstrate the AP600 Passive Contain
12.2	WCAP-13330, "Natural Convection Cooling of AP600 Containment, Rev. 0"
12.3	WCAP-13331, "Natural Convection Cooling of AP600 Containment, Rev. 0"
12.4	WCAP-13340, "Tests of Heat Transfer and Water Film Evaporation from a Simulated Containment to Demonstrate the AP600 Passive Contain
12.5	WCAP-12667, "Tests of Heat Transfer and Water Film Evaporation from a Simulated Containment to Demonstrate the AP600 Passive Contain
12.6	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A
12.7	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A
13. Integral (small scale) Tests - Phase 2A (Extension Tests)	
13.1	WCAP-13316, "Integral Containment Cooling Test Extension - Test Specification, Rev. 0"
13.2	WCAP-13315, "Integral Containment Cooling Test Extension - Test Specification, Rev. 0"
13.3	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A
13.4	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A
14. Integral (small scale) Tests - Phase 2 (Continuation Tests)	
14.1	WCAP-13315, "Integral Containment Cooling Test Extension - Test Specification, Rev. 0"
14.2	WCAP-13316, "Integral Containment Cooling Test Extension - Test Specification, Rev. 0"
14.3	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A
14.4	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A

ION TEST PROGRAM OVERVIEW

TO NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
sis	No	ET-NRC-93-4014, NSRA-APSL-93-0448	11 12 93	Borchardt
	No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
	Yes	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
	No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
sis	No	ET-NRC-93-4014, NSRA-APSL-93-0448	11 12 93	Borchardt
	No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
sis	No	ET-NRC-93-4014, NSRA-APSL-93-0448	11 12 93	Borchardt
	No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
ment Cooling System"	Yes	NS-NRC-90-3525, NPAP-APSL-90-0048	7 16 90	Donatelli
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
ment Cooling System, Rev. 0"	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
ment Cooling System, Rev. 1"	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
uxiliary Buildings"	No	ET-NRC-92-3726	7 31 92	Murley
uxiliary Buildings"	Yes	ET-NRC-92-3726	7 31 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
uxiliary Buildings"	No	ET-NRC-92-3726	7 31 92	Murley
uxiliary Buildings"	Yes	ET-NRC-92-3726	7 31 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
uxiliary Buildings"	Yes	ET-NRC-92-3726	7 31 92	Murley
uxiliary Buildings"	No	ET-NRC-92-3726	7 31 92	Murley

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO THE NRC)

	DESCRIPTION
15. 1/8th Scale Heat Transfer Tests - Phase 1 (Baseline)	
15.1	WCAP-13267, "Test Specification: Large Scale Passive Containment Cooling Test, Rev. 1"
15.2	WCAP-13268, "Test Specification" Large Scale Passive Containment Cooling Test, Rev. 1"
15.3	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A
15.4	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A
15.5	WCAP-13566, "AP600 1/8th Large Scale Passive Containment Cooling System Heat Transfer Test Baseline Data Report," Rev. 0,
15.6	WCAP-13567, "AP600 1/8th Large Scale Passive Containment Cooling System Heat Transfer Test Baseline Data Report," Rev. 0
16. 1/8th Scale Heat Transfer Test - Phase 2 (Confirmatory)	
16.1	WCAP-13267, "Test Specification: Large Scale Passive Containment Cooling Test, Rev. 1"
16.2	WCAP-13268, "Test Specification" Large Scale Passive Containment Cooling Test, Rev. 1"
16.3	Phase 2 Large Scale Test Matrix Rationale; Information in Support of Request for Additional Information on the AP600 Design (RAI 480.12)
16.4	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Constant Pressure Tests (Tests 202.3 and 203.3)
16.5	Facility "as-built" Drawings for AP600 PCCS Large Scale Test Facility
16.6	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Tests 212.1 and 213.1
16.7	Heat Sink Data for AP600 PCCS Large Scale Phase 2 Test Facility
16.8	Proposed Initial Conditions Data and Forcing Functions for Large Scale Phase 2 Test 220.1
16.9	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Tests 214.1 and 215.1
16.10	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Tests 217.1 and 218.1
16.11	Test Description Package for AP600 PCCS Large Scale Phase 2 Test: Test 220.1
16.12	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Test 216.1
16.13	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Test 219.1
16.14	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Test 221.1
16.15	Presentation Materials from the February 23-24, 1994 Meeting on AP600 PCCS Tests and Analysis
16.16	Presentation Materials from the March 17, 1994 Meeting on AP600 Passive Containment Cooling System Design Basis Analyses
16.17	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Test 222.1
16.18	Westinghouse AP600 Letter Report, "Radiation Heat Transfer Through Fog in the PCCS Air Gap"
16.19	Westinghouse AP600 Letter Report, "Liquid Film Model Validation"
16.20	Quick Look Data Report for AP600 PCCS Large Scale Phase 2 Tests: Tests 222.2, 222.3, 222.4

ION TEST PROGRAM OVERVIEW

O NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	Yes	ET-NRC-92-3688, NSRA-APSL 92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Auxiliary Buildings"	Yes	ET-NRC-92-3726	7 31 92	Murley
Auxiliary Buildings"	No	ET-NRC-92-3726	7 31 92	Murley
	Yes	ET-NRC-93-3801, NSRA-APSL-93-0012	1 25 93	Murley
	No	ET-NRC-93-3801, NSRA-APSL-93-0012	1 25 93	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-93-3961, NSRA-APSL-93-0334	9 23 93	Borchardt
	Yes	ET-NRC-93-3981, NSRA-APSL-93-0380	10 4 93	Borchardt
	Yes	ET-NRC-93-3983, NSRA-APSL-93-0381	10 6 93	Borchardt
	Yes	ET-NRC-93-3991, NSRA-APSL-93-0394	10 15 93	Borchardt
	Yes	ET-NRC-93-3997, NSRA-APSL-93-0405	10 21 93	Borchardt
	No	ET-NRC-93-3998, NSRA-APSL-93-0406	10 22 93	Borchardt
	Yes	ET-NRC-93-4006, NSRA-APSL-93-0421	10 29 93	Borchardt
	Yes	ET-NRC-93-4012, NSRA-APSL-93-0446	11 12 93	Borchardt
	Yes	ET-NRC-93-4030, NSRA-APSL-93-0495	12 20 93	Borchardt
	Yes	ET-NRC-94-4035, NSRA-APSL-94-0002	1 18 94	Borchardt
	Yes	NTD-NRC-94-4053, SAL/NRC0037	1 28 94	Borchardt
	Yes	NTD-NRC-94-4062, DCP/NRC0004	2 11 94	Borchardt
	Yes	NTD-NRC-94-4067, DCP/NRC0009	2 23 94	Borchardt
	Yes	NTD-NRC-94-4083, DCP/NRC0023	3 21 94	Borchardt
	Yes	NTD-NRC-94-4090, DCP/NRC0028	4 4 94	Borchardt
	Yes	NTD-NRC-94-4100, DCP/NRC0035	4 18 94	Borchardt
	Yes	NTD-NRC-94-4100, DCP/NRC0035	4 18 94	Borchardt
	Yes	NTD-NRC-94-4121, DCP/NRC0054	5 4 94	Borchardt

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO THE NRC)

	DESCRIPTION
17. Water Distribution System Test - Phase 1 (20ft Diameter)	
17.1	WCAP-13353, "Passive Containment Cooling System Water Distribution Phase 1 Test Data Report, Rev. 0"
17.2	WCAP-13354, "Passive Containment Cooling System Water Distribution Phase 1 Test Data Report, Rev. 0"
17.3	WCAP-13291, "Passive Containment Cooling System Water Distribution Test, Rev. 0"
17.4	WCAP-13290, "Passive Containment Cooling System Water Distribution Test, Rev. 0"
17.5	WCAP-13293, "Construction/Test Plan For the Passive Containment Cooling System Test Articles, Rev. 0"
17.6	WCAP-13292, "Construction/Test Plan For the Passive Containment Cooling System Test Articles, Rev. 0"
17.7	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Au
17.8	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Au
18. Water Distribution System Test - Phase 2 (1/8th Sector)	
18.1	WCAP-13291, "Passive Containment Cooling System Water Distribution Test, Rev. 0"
18.2	WCAP-13297, "PCS Water Distribution Test Phase II Test Data Report"
18.3	WCAP-13296, "PCS Water Distribution Test Phase II Test Data Report"
18.4	WCAP-13290, "Passive Containment Cooling System Water Distribution Test, Rev. 0"
18.5	WCAP-13293, "Construction/Test Plan For the Passive Containment Cooling System Test Articles, Rev. 0"
18.6	WCAP-13292, "Construction/Test Plan For the Passive Containment Cooling System Test Articles, Rev. 0"
18.7	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Au
18.8	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Au
19. Water Distribution System Test - Phase 3	
19.1	WCAP-13292, "Construction/Test Plan For the Passive Containment Cooling System Test Articles, Rev. 0"
19.2	WCAP-13293, "Construction/Test Plan For the Passive Containment Cooling System Test Articles, Rev. 0"
19.3	WCAP-13816, "Phase 3 Passive Containment Cooling System Water Distribution Test"
19.4	WCAP-13817, "Phase 3 Passive Containment Cooling System Water Distribution Test"
19.5	WCAP-13960, "PCS Water Distribution Phase 3 Test Data Report," Revision 0
19.6	WCAP-13961, "PCS Water Distribution Phase 3 Test Data Report," Revision 0
20. Wind Tunnel Test - Phase 1	
20.1	WCAP-13294, "Phase I Wind Tunnel Testing For the Westinghouse AP600 Reactor"
20.2	WCAP-13295, "Phase I Wind Tunnel Testing For the Westinghouse AP600 Reactor"
20.3	WCAP-13318, "Passive Containment Cooling System Wind Tunnel Test Specification, Rev. 0"
20.4	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Au
20.5	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & Au

ION TEST PROGRAM OVERVIEW

O NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Auxiliary Buildings*	No	ET-NRC-92-3726	7 31 92	Murley
Auxiliary Buildings*	Yes	ET-NRC-92-3726	7 31 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Auxiliary Buildings*	Yes	ET-NRC-92-3726	7 31 92	Murley
Auxiliary Buildings*	No	ET-NRC-92-3726	7 31 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-93-3952, NSRA-APSL-93-0318	8 19 93	Borchardt
	No	ET-NRC-93-3952, NSRA-APSL-93-0318	8 19 93	Borchardt
	Yes	NTD-NRC-94-4056, DCP/NRC0002	2 2 94	Borchardt
	No	NTD-NRC-94-4056, DCP/NRC0002	2 2 94	Borchardt
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Auxiliary Buildings*	No	ET-NRC-92-3726	7 31 92	Murley
Auxiliary Buildings*	Yes	ET-NRC-92-3726	7 31 92	Murley

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TABLE B - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO THE NRC)

	DESCRIPTION
21. Wind Tunnel Test - Phase 2	
21.1	WCAP-13318, "Passive Containment Cooling System Wind Tunnel Test Specification, Rev. 0"
21.2	WCAP-13412, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A"
21.3	WCAP-13246, "Westinghouse-GOTHIC: A Computer Code For Analyses of Thermal Hydraulic Transients for Nuclear Plant Containments & A"
21.4	WCAP-13323, Rev. 0, "Phase II Wind Tunnel Testing for the Westinghouse AP600 Reactor"
21.5	WCAP-13J24, Rev. 0, "Phase II Wind Tunnel Testing for the Westinghouse AP600 Reactor"
22. Wind Tunnel Test - Phase 4A	
22.1	WCAP-13318, "Passive Containment Cooling System Wind Tunnel Test Specification, Rev. 0"
22.2	WCAP-13757, "Wind Tunnel Phase 4A Test Plan, Investigation of the High Reynolds Number Behavior of the Westinghouse AP600 System,"
22.3	WCAP-13756, "Wind Tunnel Phase 4A Test Plan, Investigation of the High Reynolds Number Behavior of the Westinghouse AP600 System,"
23. Wind Tunnel Test - Phase 4B	
23.1	WCAP-13318, "Passive Containment Cooling System Wind Tunnel Test Specification, Rev. 0"
23.2	WCAP-14005, "Wind Tunnel Phase 4B Test Plan, Investigation of the Effects of Siting on the Wind Behavior of the Westinghouse AP600 System"
23.3	WCAP-14006, "Wind Tunnel Phase 4B Test Plan, Investigation of the Effects of Siting on the Wind Behavior of the Westinghouse AP600 System"
24. PRHR Heat Exchanger Test - Phase 1	
24.1	WCAP-12666, "AP600 Passive Residual Heat Removal Heat Exchanger Test, Test Report"
25. PRHR Heat Exchanger Test - Phase 2	
25.1	WCAP-13368, "Passive RHR Heat Exchanger Test Extension, Rev. 0"
25.2	WCAP-13369, "Passive RHR Heat Exchanger Test Extension, Rev. 0"
25.3	WCAP-13573, "AP600 Passive Residual Heat Exchanger Test Final Report"
25.4	WCAP-12980, Rev. 1, "AP600 Passive Residual Heat Exchanger Test Final Report"
26. Automatic Depressurization System Test - Phase A (Sparger)	
26.1	WCAP-13343, "AP600 Automatic Depressurization System Test, Rev. 0"
26.2	WCAP-13342, "AP600 Automatic Depressurization System Test, Rev 0"
26.3	Presentation Material from the April 20, 1993 Meeting on the AP600 ADS Tests at the VAPORE Facility
26.4	Presentation Material from the May 4, 1993 Meeting to discuss the AP600 ADS Phase A Test Results
26.5	Presentation Materials from the May 26-27, 1993 Meeting on the AP600 ADS Tests

ION TEST PROGRAM OVERVIEW

O NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
Auxiliary Buildings"	No	ET-NRC-92-3726	7 31 92	Murley
Auxiliary Buildings"	Yes	ET-NRC-92-3726	7 31 92	Murley
	Yes	ET-NRC-92-3753, NSRA-APSL-92-0198	10 2 92	Murley
	No	ET-NRC-92-3753, NSRA-APSL-92-0198	10 2 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-93-3926, NSRA-APSL-93-0250	7 15 93	Borchardt
	Yes	ET-NRC-93-3926, NSRA-APSL-93-0250	7 15 93	Borchardt
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
em"	Yes	NTD-NRC-94-4082, DCP/NRC0020	3 21 94	Borchardt
em"	No	NTD-NRC-94-4082, DCP/NRC0020	3 21 94	Borchardt
	Yes	NS-NRC-90-3525, NPAP-APSL-90-0048	7 16 90	Donatell
	Yes	ET-NRC-92-3730, NSRA-APSL-92-0161	8 7 92	Murley
	No	ET-NRC-92-3730, NSRA-APSL-92-0161	8 7 92	Murley
	No	ET-NRC-92-3779, NSRA-APSL-92-0259	12 15 92	Murley
	Yes	ET-NRC-92-3779, NSRA-APSL-92-0259	12 15 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-93-3877, NSRA-APSL-93-0159	5 3 93	Borchardt
	Yes	ET-NRC-93-3879, NSRA-APSL-93-0166	5 5 93	Borchardt
	Yes	ET-NRC-93-3881, NSRA-APSL-93-0197	6 1 93	Borchardt

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO THE NRC)

	DESCRIPTION
27. Automatic Depressurization System Test - Phase B	
27.1	WCAP-13343, "AP600 Automatic Depressurization System Test, Rev. 0"
27.2	WCAP-13342, "AP600 Automatic Depressurization System Test, Rev 0"
27.3	Presentation Material from the April 20, 1993 Meeting on the AP600 ADS Tests at the VAPORE Facility
27.4	AP600 Automatic Depressurization System Phase B Test Matrix, Revision 1
27.5	Preliminary Facility Design Drawings for the AP600 ADS Phase B Tests
27.6	Presentation Materials from the May 26-27, 1993 Meeting on the AP600 ADS Tests
27.7	AP600 Automatic Depressurization System Phase B Test Matrix, Revision 1A
27.8	Presentation Materials from the January 25, 1994 Meeting on AP600 ADS Design Certification Test Plans
27.9	Additional Information in Support of Westinghouse Response to RAI 952.64 on the AP600 Design
28. Core Makeup Tank Test	
28.1	WCAP-13345, "AP600 Core Make-Up Tank Test Specification, Rev. 0"
28.2	Material in Support of February 25, 1993 Westinghouse/NRC Meeting on CMT Tests for AP600 (Test Matrix, Instrument List, Drawings)
28.3	Presentation Material from the February 25, 1993 Westinghouse/NRC meeting on the AP600 CMT Tests
28.4	Transmittal of Drawing of Steam Distributer for AP600 Core Makeup Tank Test
28.5	Draft Scaling Analysis for the AP600 Core Makeup Tank Separate Effects Tests
28.6	WCAP-13345, "AP600 Core Makeup Tank Test Specification", Revision 2
28.7	WCAP-13963, "Scaling Logic for the Core Makeup Tank Test," Revision 0
28.8	WCAP-13975, "Scaling Logic for the Core Makeup Tank Test," Revision 0
28.9	Response to Requests for Additional Information on the AP600 Core Makeup Tank Tests
28.10	Presentation Materials from the March 14, 1994 Meeting on AP600 Core Makeup Tank Tests and Analysis
29. DNBR Tests	
29.1	WCAP-12488, "Westinghouse Fuel Criteria Evaluation Process"
29.2	Test Matrix for AP600 Departure from Nucleate Boiling Tests

ION TEST PROGRAM OVERVIEW

D NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-93-3877, NSRA-APSL-93-0159	5 3 93	Borchardt
	Yes	ET-NRC-93-3885, NSRA-APSL-93-0171	5 11 93	Borchardt
	Yes	ET-NRC-93-3893, NSRA-APSL-93-0189	5 24 93	Borchardt
	Yes	ET-NRC-93-3881, NSRA-APSL-93-0197	6 1 93	Borchardt
	Yes	ET-NRC-93-3881, NSRA-APSL-93-0197	6 1 93	Borchardt
	Yes	NTD-NRC-94-4050, NSRA-APSL-94-0030	1 25 94	Borchardt
	Yes	NTD-NRC-94-4109, DCP/NRC0043	4 29 94	Borchardt
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-93-3823, NSRA-APSL-93-0042	2 18 93	Borchardt
	Yes	ET-NRC-93-3829, NSRA-APSL-93-0053	2 25 93	Borchardt
	Yes	ET-NRC-93-3944, NSRA-APSL-93-0303	8 16 93	Borchardt
	Yes	ET-NRC-93-4031, NSRA-APSL-93-0497	12 20 93	Borchardt
	No	NTD-NRC-94-4068, DCP/NRC0010	2 22 94	Borchardt
	Yes	NTD-NRC-94-4068, DCP/NRC0010	2 22 94	Borchardt
	No	NTD-NRC-94-4068, DCP/NRC0010	2 22 94	Borchardt
	No	NTD-NRC-94-4076, DCP/NRC0015	3 4 94	Borchardt
	Yes	NTD-NRC-94-4081	3 21 94	Borchardt
	Yes	NS-NRC-90-3482	4 2 90	Wilson
	Yes	ET-NRC-93-3984, NSRA-APSL-93-0385	10 8 93	Borchardt

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO NRC)

	DESCRIPTION
30. Low Pressure 1/4 Height Integral Systems Tests	
30.1	Scaling Report on Glass Model of the AP600
30.2	WCAP-13234, "AP600 Long Term Cooling Test Specification, Rev. 0"
30.3	WCAP-13283, "AP600 Long Term Cooling Test Specification, Rev. 0"
30.4	Draft Scaling Analysis for the OSU AP600 Integral Systems Test
30.5	Material in Support of Westinghouse/NRC Meeting on OSU Test Program for AP600 (Test Schedule, Draft Scaling Report, Test Specification Matrix and Facility Design Drawings)
30.6	Presentation Material from December 9-10, 1992 Westinghouse/NRC Meetings on AP600 Test Program
30.7	Component and Piping Drawing for the AP600 Long Term Cooling Tests
30.8	WCAP-13283 Revision 1, "Long Term Cooling Test,"
30.9	WCAP-13234 Revision 1, "Long Term Cooling Test,"
30.10	Response to INEL Requests for Information regarding OSU Long Term Cooling Test Facility (Requests dated April 14, 1993 and May 12, 1993)
30.11	RELAP5/MOD3 Input File Notebook for OSU/AP600 Components
30.12	Draft Scaling Analysis for the OSU AP600 Integral System and Long Term Cooling Test Facility
30.13	Facility Drawings and Piping and Instrumentation Diagrams for the AP600 Long Term Cooling Test Facility at Oregon State University
30.14	Presentation Materials from the September 20, 1993 Meeting on AP600 Low Pressure Integral Systems Tests at Oregon State University
30.15	Information on Test Conditions for AP600 Testing Performed at the SPES-2 and OSU Test Facilities
31. Full Pressure Full Height Integral Systems Tests	
31.1	WCAP-13277, "Scaling Design and Verification of SPES-2, the Italian Experimental Facility Simulator of the AP600 Plant"
31.2	WCAP-13278, "Scaling Design and Verification of SPES-2, the Italian Experimental Facility Simulator of the AP600 Plant"
31.3	NRC Request for Additional Information Related to SPES-2 Test Facility
31.4	Material in Support of Westinghouse/NRC Meeting on SPES Test Program for AP600 (Test Schedule, Draft Scaling Report, Draft Test Specification)
31.5	Presentation Material from December 9-10, 1992 Westinghouse/NRC Meetings on AP600 Test Program
31.6	Component and Piping Drawings for the SPES-2 Facility
31.7	Presentation Material from the April 22, 1993 Meeting on the AP600 Integral Systems Tests at SPES-2 Facility
31.8	WCAP-13278 Revision 1, "Scaling, Design, and Verification of SPES-2, The Italian Experimental of the AP600; Scaling Update"
31.9	WCAP-13277 Revision 1, "Scaling, Design, and Verification of SPES-2, The Italian Experimental of the AP600; Scaling Update"
31.10	SPES-1 Pump Characterization, SIET NT/54
31.11	Response to INEL Request for SPES-2 Information/Clarification MGO-29-93
31.12	SPES-1 System Description, SIET NT/32
31.13	Information on Test Conditions for AP600 Testing Performed at the SPES-2 and OSU Test Facilities
31.14	WCAP-14053, Revision 0, "AP600 FHFP Integral Systems Test Specification"
31.15	WCAP-14056, Revision 0, "AP600 FHFP Integral Systems Test Specification"

ION TEST PROGRAM OVERVIEW

NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
	No	NPAP-APSL-91-0095	3 5 91	Sheron
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3715, NSRA-APSL-92-0132	7 7 92	Murley
port, Updated Instrumentation List, Test	Yes	ET-NRC-92-3775, NSRA-APSL-92-0250	11 24 92	Murley
	Yes	ET-NRC-92-3785, NSRA-APSL-92-0268	12 17 92	Murley
	Yes	ET-NRC-93-3830, NSRA-APSL-93-0062	3 3 93	Borchardt
	No	ET-NRC-93-3883, NSRA-APSL-93-0169	5 11 93	Borchardt
	Yes	ET-NRC-93-3883, NSRA-APSL-93-0169	5 11 93	Borchardt
	Yes	ET-NRC-93-3901, NSRA-APSL-93-206	6 10 93	Borchardt
	Yes	ET-NRC-93-3932, NSRA-APSL-93-0273	7 27 93	Wilson
	Yes	ET-NRC-93-3933, NSRA-APSL-93-0274	7 28 93	Wilson
	Yes	ET-NRC-93-3969, NSRA-APSL-93-0350	9 17 93	Borchardt
	Yes	ET-NRC-93-3993, NSRA-APSL-93-0401	10 15 93	Borchardt
	Yes	NTD-NRC-94-4070, DCP/NRC0012	3 31 94	Borchardt
	Yes	ET-NRC-92-3685, NSRA-APSL-92-0082	4 3 92	Murley
	No	ET-NRC-92-3685, NSRA-APSL-92-0082	4 3 92	Murley
	Yes	ET-NRC-92-3749, NSRA-APSL-92-0108	9 14 92	Murley
tion)	Yes	ET-NRC-92-3776, NSRA-APSL-92-0251	11 24 92	Murley
	Yes	ET-NRC-92-3785, NSRA-APSL-92-0268	12 17 92	Murley
	Yes	ET-NRC-93-3825, NSRA-APSL-93-0046	2 23 93	Borchardt
	Yes	ET-NRC-93-3877, NSRA-APSL-93-0159	5 3 93	Borchardt
	No	ET-NRC-93-3883, NSRA-APSL-93-0169	5 11 93	Borchardt
	Yes	ET-NRC-93-3883, NSRA-APSL-93-0169	5 11 93	Borchardt
	No	ET-NRC-93-3943, NSRA-APSL-93-0300	8 12 93	Borchardt
	No	ET-NRC-93-3943, NSRA-APSL-93-0300	8 12 93	Borchardt
	No	ET-NRC-93-3943, NSRA-APSL-93-0300	8 12 93	Borchardt
	Yes	NTD-NRC-94-4070, DCP/NRC0012	3 31 94	Borchardt
	Yes	NTD-NRC-94-4122, DCP/NRC0055	5 4 94	Borchardt
	No	NTD-NRC-94-4122, DCP/NRC0055	5 4 94	Borchardt

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO THE NRC)

	DESCRIPTION
32. Other Tests	
32.1	WCAP-12668, "AP600 High Inertia Rotor Testing - Phase I, Test Report"
32.2	WCAP-13299, "RCP Air Model Test Report, Rev. 0"
32.3	WCAP-12648, "AP600 Incore Instrumentation System Electromagnetic Interference Test Report, Rev. 1"
32.4	WCAP-13352, "Studies of Hydraulic Phenomena in the Reactor Vessel Lower Plenum Region - Test Report, Rev. 0"
32.5	WCAP-13305, "Studies of Hydraulic Phenomena In Reactor Lower Plenum Region - Test Plan"
32.6	WCAP-13298, "RCP Air Model Test Report, Rev. 0"
32.7	WCAP-13322, "AP600 Incore Instrumentation System Electromagnetic Interference Test Report, Rev. 0"
32.8	WCAP-13312, "Journal Bearing Test - Task 2 Test Specification"
32.9	WCAP-13313, "Journal Bearing Test - Task Plan For the DOE Phase II High Inertia Rotor Test Program"
32.10	WCAP-13320, "AP600 High Inertia Rotor Testing Phase 2 Report, Rev. 0"
32.11	WCAP-12668, "AP600 High Inertia Rotor Testing Phase 1 Test Report, Rev. 1"
32.12	WCAP-13319, "AP600 High Inertia Rotor Testing Phase 2 Report, Rev. 0"
32.13	WCAP-13288, "Passive Core Cooling System Check Valve Test Specification, Rev. 0"
32.14	WCAP-13284, "Test Plan For the Passive Core Cooling System Check Valve Test, Rev. 0"
32.15	WCAP-13314, "Journal Bearing Test - Task Plan For the DOE Phase II High Inertia Rotor Test Program"
32.16	WCAP-13287, "AP600 Passive Core Cooling System Check Valve Test Final Report, Rev. 0"
32.17	WCAP-13285, "Test Plan For the Passive Core Cooling System Check Valve Test, Rev. 0"
32.18	WCAP-13321, "AP600 High Inertia Rotor Testing Phase 1 Report, Rev. 0"
32.19	WCAP-13286, "AP600 Passive Core Cooling System Check Valve Test Final Report, Rev. 0"
32.20	WCAP-13289, "Passive Core Cooling System Check Valve Test Specification, Rev. 0"
32.21	WCAP-13310, "Journal Bearing Test - Task 1 Test Specification"
32.22	WCAP-13351, "Studies of Hydraulic Phenomena in the Reactor Vessel Lower Plenum Region - Test Report, Rev. 0"
32.23	WCAP-13306, "Studies of Hydraulic Phenomena In Reactor Vessel Lower Plenum Region - Test Plan"
32.24	WCAP-13309, "Journal Bearing Test - Task 1 Test Specification"
32.25	WCAP-13487, Rev. 0, "High Inertia Rotor Phase 3, Task 1 Test Report"
32.26	WCAP-13488, "High Inertia Rotor Phase 3, Task 1 Test Report"
32.27	WCAP-13560, "Advanced Plant Check Valve Study", Rev. 0
32.28	WCAP-13743, "Heavy Water Reactor Facility Project Phase 1 AP600 Small Scale Passive Containment Cooling System Test 'Dry' Test Results 91-0021"
32.29	WCAP-13742, "Heavy Water Reactor Facility Project Phase 1 AP600 Small Scale Passive Containment Cooling System Test 'Dry' Test Results 91-0021"
32.30	WCAP-13726, "Heavy Water Reactor Facility (HWRP) Large Scale Passive Containment Cooling System Baseline Test Data Report HWRP-92-003, Revision 1"
32.31	WCAP-13728, "Heavy Water Reactor Facility (HWRP) Small Scale Containment Cooling System Test Final Report HWRP-RPT-92-003, Revision 1"
32.32	WCAP-13733, "Heavy Water Reactor Facility (HWRP) Small Scale Containment Cooling System Test Preliminary Series 2 Test Results HWRP-RPT-92-003, Revision 1"
32.33	WCAP-13725, "Heavy Water Reactor Facility (HWRP) Large Scale Passive Containment Cooling System Baseline Test Data Report HWRP-RPT-92-003, Revision 1"
32.34	WCAP-13727, "Heavy Water Reactor Facility (HWRP) Small Scale Containment Cooling System Test Final Report HWRP-RPT-92-003, Revision 1"

ION TEST PROGRAM OVERVIEW

NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESS/ET
	Yes	NS-NRC-90-3525, NPAP-APSL-90-0048	7 16 90	Donatell
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	No	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3688, NSRA-APSL-92-0094	4 30 92	Murley
	Yes	ET-NRC-92-3753, NSRA-APSL-92-0198	10 2 92	Murley
	No	ET-NRC-92-3753, NSRA-APSL-92-0198	10 2 92	Murley
	No	ET-NRC-93-3801, NSRA-APSL-93-0012	1 25 93	Murley
Applicable to the HWRP Project NPR-RPT-	No	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt
Applicable to the HWRP Project NPR-RPT-	Yes	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt
04," Revision 1	No	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt
1	No	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt
001	No	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt
-92-004," Revision 1	Yes	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt
1	Yes	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt

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TABLE 8 - TEST PROGRAM REFERENCES (SUMMARY OF WESTINGHOUSE AP600 TEST PROGRAM RELATED MATERIALS TRANSMITTED TO THE NRC)

	DESCRIPTION
32.35	WCAP-13732, "Heavy Water Reactor Facility (HWRF) Small Scale Containment Cooling Test Preliminary Series 2 Test Results HWRF-RPT-9"
32.36	WCAP-13758, "High Inertia Rotor Test Phase 3 Report," June, 1993
32.37	WCAP-13759, "High Inertia Rotor Test Phase 3 Report," June, 1993
32.38	WCAP-13415, "High Inertia Rotor Test 3 Task 1, Test Specification,"
32.39	WCAP-13413, "RCP Hydraulic Flow Test Prospectus,"
32.40	WCAP-13420, "High Inertia Rotor Test Phase 3 Test Plan,"
32.41	WCAP-13419, "High Inertia Rotor Test Phase 3 Test Plan,"
32.42	WCAP-13414, "RCP Hydraulic Flow Test Prospectus,"
32.43	M. H. Kim, "Modelling of Condensation Heat Transfer in a Reactor Containment," PhD Thesis (1985)
32.44	WCAP-14045, "In Situ Check Valve Test Report (Fall Outage '93)"

ION TEST PROGRAM OVERVIEW

O NRC)				
	PROPRIETARY	TRANSMITTAL LETTER	DATE	ADDRESSEE
2-001	Yes	ET-NRC-93-3903, NSRA-APSL-93-0208	6 14 93	Borchardt
	Yes	ET-NRC-93-3918, NSRA-APSL-93-0238	7 7 93	Borchardt
	No	ET-NRC-93-3918, NSRA-APSL-93-0238	7 7 93	Borchardt
	No	ET-NRC-93-3926, NSRA-APSL-93-0250	7 15 93	Borchardt
	Yes	ET-NRC-93-3926, NSRA-APSL-93-0250	7 15 93	Borchardt
	No	ET-NRC-93-3926, NSRA-APSL-93-0250	7 15 93	Borchardt
	Yes	ET-NRC-93-3926, NSRA-APSL-93-0250	7 15 93	Borchardt
	No	ET-NRC-93-3926, NSRA-APSL-93-0250	7 15 93	Borchardt
	No	ET-NRC-93-3945, NSRA-APSL-93-0304	8 16 93	Borchardt
	No	NTD-NRC-94-4120, DCP/NRC0053	5 4 94	Borchardt

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

Table 9 - Summary of NRC Requests for Additional Information (RAI) Related to AP600 Tests and Analysis

RAI No.	Description/Issue	NRC Ltr. Date	Westinghouse Response Letter No.	West. Response Letter Date
440.001	SPES test, check valve testing & PRHR testing	09/23/92	ET-NRC-92-3777	11/30/92
440.001R01	SPES test, check valve testing & PRHR testing	/ /		/ /
440.002	CMT testing	09/23/92	ET-NRC-93-3795	01/14/93
440.002R01	CMT testing	09/23/92	NTD-NRC-94-4087	03/24/94
440.003	CMT testing	09/23/92	ET-NRC-93-3804	01/22/93
440.004	CMT testing	09/23/92	ET-NRC-92-3777	11/30/92
440.004R01	CMT testing	09/23/92	NTD-NRC-94-4087	03/24/94
440.005	CMT testing	09/23/92	ET-NRC-92-3777	11/30/92
440.005R01	CMT testing	09/23/92	NTD-NRC-94-4087	03/24/94
440.006	CMT testing	09/23/92	ET-NRC-92-3777	11/30/92
440.006R01	CMT testing	/ /	NTD-NRC-94-4087	03/24/94
440.007	CMT testing	09/23/92	ET-NRC-92-3777	11/30/92
440.008	CMT testing	09/23/92	ET-NRC-92-3777	11/30/92
440.009	CMT testing	09/23/92	ET-NRC-92-3777	11/30/92
440.010	CMT testing	09/23/92	ET-NRC-92-3777	11/30/92
440.010R01	CMT testing	09/23/92	NTD-NRC-94-4087	03/24/94
440.011	ADS testing	09/23/92	ET-NRC-92-3777	11/30/92
440.011R01	ADS testing	/ /		/ /
440.012	ADS testing	09/23/92	ET-NRC-92-3777	11/30/92
440.012R01	ADS testing	/ /		/ /
440.013	ADS testing	09/23/92	ET-NRC-93-3804	01/22/93
440.013R01	ADS testing	/ /	NTD-NRC-94-4059	02/03/94
440.014	ADS testing	09/23/92	ET-NRC-93-3804	01/22/93
440.014R01	ADS testing	/ /		/ /
440.015	ADS testing	09/23/92	ET-NRC-92-3777	11/30/92
440.016	ADS testing	09/23/92	ET-NRC-93-3795	01/14/93
440.017	ADS testing	09/23/92	ET-NRC-93-3804	01/22/93
440.018	ADS testing	09/23/92	ET-NRC-93-3804	01/22/93

440.019	ADS testing	09/23/92	ET-NRC-92-3777	11/30/92
440.020	Regulatory treatment of nonsafety systems	09/23/92	ET-NRC-93-3804	01/22/93
440.021	Post 72-hour operation	09/23/92	ET-NRC-93-3804	01/22/93
440.022	Fuel design and analysis	09/23/92	ET-NRC-92-3789	12/22/92
440.023	Mid-loop operations	09/23/92	ET-NRC-92-3789	12/22/92
440.024	Analytical codes	09/23/92	ET-NRC-93-3804	01/22/93
440.024R01	Analytical codes	/ /		/ /
440.024R02	Analytical codes	/ /		/ /
440.025	Appendix K	09/23/92	ET-NRC-93-3804	01/22/93
440.026	ATWS	09/23/92	ET-NRC-93-3804	01/22/93
440.026R01	ATWS	09/23/92	NTD-NRC-94-4075	03/04/94
440.027	Multiple SGTR	09/23/92	ET-NRC-93-3804	01/22/93
440.027R01	Multiple SGTR (Revised Response)	/ /		/ /
440.028	Tech Specs for nonsafety systems	09/23/92	ET-NRC-93-3795	01/14/93
440.029	Safe shutdown; PRA evaluation of safe shutdown	09/23/92	ET-NRC-93-3804	01/22/93
440.030	Interfacing system LOCA	09/23/92	ET-NRC-92-3789	12/22/92
440.031	Credit in analysis for nonsafety systems	09/23/92	ET-NRC-93-3804	01/22/93
440.032	Emergency response guidelines	01/26/93	ET-NRC-93-3886	05/14/93
440.032R01	Emergency response uidelines	/ /		/ /
440.033	Applicability of 3-tube PRHR tests	02/18/93	ET-NRC-93-3905	06/17/93
440.034	CMT scaling tests	02/18/93	ET-NRC-93-3886	05/14/93
440.034R01	CMT scaling tests	/ /	NTD-NRC-94-4110	04/28/94
440.035	LOFTRAN/NOTRUMP AP600 models	08/05/93	ET-NRC-93-4007	11/04/93
440.035R01	LOFTRAN/NOTRUMP AP600 Models	/ /	NTD-NRC-94-4075	03/04/94
440.036	Purpose of valves V007A,-B,-C and -D	11/02/93	NTD-NRC-94-4059	02/03/94
440.037	PRHR heat exchanger heat transfer	11/02/93	NTD-NRC-94-4059	02/03/94
440.038	Hydrogen venting from the pressurizer	11/02/93	NTD-NRC-94-4059	02/03/94
440.039	"failure of a CMT discharge valve"	11/02/93	NTD-NRC-94-4059	02/03/94
440.040	MSLB analysis, feed flow assumptions	11/02/93	NTD-NRC-94-4059	02/03/94
440.041	MSLB minimum DNBR plot	11/02/93	NTD-NRC-94-4059	02/03/94
440.042	Feedline break PRHR delay rationale	11/02/93	NTD-NRC-94-4059	02/03/94
440.043	Locked rotor failed fuel assumptions	11/02/93	NTD-NRC-94-4059	02/03/94

Key:

440	NRR - Reactor Systems Branch
480	NRR - Containment Systems Branch
951	RES (Containment Systems)
952	RES (Reactor Systems)

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

Table 9 - Summary of NRC Requests for Additional Information (RAI) Related to AP600 Tests and Analysis (cont.)

RAI No.	Description/Issue	NRC Ltr. Date	Westinghouse Response Letter No.	West. Response Letter Date
440.044	Rationale for locked rotor being limiting	11/02/93	NTD-NRC-94-4059	02/03/94
440.045	Rod ejection failed fuel assumptions	11/02/93	NTD-NRC-94-4059	02/03/94
440.046	Inadvertant 4th stage opening at pressure	11/02/93	NTD-NRC-94-4059	02/03/94
440.047	SGTR-SG overflow analytical results	11/02/93	NTD-NRC-94-4059	02/03/94
440.048	Assumptions on available equipment/boron dilution	11/02/93	NTD-NRC-94-4059	02/03/94
440.048R01	Assumptions on available equipment/boron dilution	/ /	NTD-NRC-94-4105	04/21/94
440.049	ADS Phase B test facility configuration	01/13/94	NTD-NRC-94-4099	04/14/94
440.050	Impact of ADS design change on OSU & SPES	01/13/94	NTD-NRC-94-4087	03/24/94
440.051	Limiting single failures in light of ADS change	01/13/94	NTD-NRC-94-4099	04/14/94
440.052	CMT Scaling Report	03/07/94		/ /
440.053	Assessment of AP600 vs. NUREG-1449 issues	04/15/94		/ /
440.054	Potential rapid boron dilution scenarios	04/15/94		/ /
440.055	Failure of temporary RCS boundaries	04/15/94		/ /
440.056	Instrumentation available during shutdown/midloop	04/15/94		/ /
440.057	EPGs for shutdown and mid-loop operations	04/15/94		/ /
440.058	Tech Spec changes to deal with shutdown operations	04/15/94		/ /
440.059	Design features for mid-loop	04/15/94		/ /
440.060	Design features to minimize loss of ac power	04/15/94		/ /
440.061	Design features to minimize shutdown risk	04/15/94		/ /
440.062	Design features to reduce passive systems challenge	04/15/94		/ /
440.063	Analysis of system performance during shutdown	04/15/94		/ /
440.064	Procedures during reduced inventory operation	04/15/94		/ /
440.065	Outage and maintenance activities	04/15/94		/ /
440.066	Applicable modes for SSAR safety analyses	04/15/94		/ /
440.067	RHR system operation during mid-loop operation	04/15/94		/ /
440.068	Vulnerabilities for shutdown/midloop operation	04/15/94		/ /
440.069	Compliance with GL 87-12	04/15/94		/ /
440.070	Containment closure/reduced inventory operation	04/15/94		/ /

440.071	Operating experience for shutdown events	04/15/94		/ /
440.072	Action items from GL 88-17	04/15/94		/ /
440.073	Control Rod Position Monitoring System	04/19/94		/ /
480.001	Operator actions during 72-hours post-accident	09/23/92	ET-NRC-92-3789	12/22/92
480.002	PCS heat transfer correlations	09/23/92	ET-NRC-93-3804	01/22/93
480.003	Failure modes for PCS	09/23/92	ET-NRC-92-3789	12/22/92
480.004	HWRP Test Data	04/13/93	ET-NRC-93-3895	05/28/93
480.004R01	HWRP Test Data	/ /		/ /
480.005	Wind tunnel tests	04/28/93	ET-NRC-93-3914	07/01/93
480.006	Safety relief valve pool dynamic loads/temp limits	07/01/93	ET-NRC-93-3962	09/03/93
480.007	EQ of components inside containmnet	07/01/93	ET-NRC-93-3962	09/03/93
480.008	Natural circulation of air in PCCS	07/01/93	ET-NRC-93-3962	09/03/93
480.009	Heat transfer & mixing in containment	07/01/93	ET-NRC-93-3962	09/03/93
480.010	Jet discharge	07/01/93	ET-NRC-93-3962	09/03/93
480.011	1/8-scale facility instrumentation	07/01/93	ET-NRC-93-3962	09/03/93
480.012	1/8-scale facility test matrix	07/01/93	ET-NRC-93-3962	09/03/93
480.013	Westinghouse scaling approach	07/01/93	ET-NRC-93-3962	09/03/93
480.013R01	Westinghouse scaling approach	/ /		/ /
480.014	Mechanistic correlations in WGOETHIC	07/01/93	ET-NRC-93-3963	09/10/93
480.015	WGOETHIC validation with test data	07/01/93	ET-NRC-93-3962	09/03/93
480.015R01	WGOETHIC validation with test data	/ /		/ /
480.016	WGOETHIC numerics	07/01/93	ET-NRC-93-3962	09/03/93
480.017	External film pattern/water distribution	07/01/93	ET-NRC-93-3962	09/03/93
480.017R01	External film pattern/water distribution	/ /		/ /
480.018	Degree of rain in containment	07/01/93	ET-NRC-93-3962	09/03/93
480.019	Reactor vessel cooling/insulation	07/01/93	ET-NRC-93-3962	09/03/93
480.020	Reactor vessel cooling	07/01/93	ET-NRC-93-3962	09/03/93
480.021	Reactor vessel cooling - subcooled water	07/01/93	ET-NRC-93-3962	09/03/93
480.022	High pressure melt ejection	07/01/93	ET-NRC-93-3962	09/03/93
480.023	Steam explosions	07/01/93	ET-NRC-93-3962	09/03/93
480.024	Core debris equilibrium height	07/01/93	ET-NRC-93-3962	09/03/93

Key:

440	NRR - Reactor Systems Branch
480	NRR - Containment Systems Branch
951	RES (Containment Systems)
952	RES (Reactor Systems)

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

Table 9 - Summary of NRC Requests for Additional Information (RAI) Related to AP600 Tests and Analysis (cont.)

RAI No.	Description/Issue	NRC Ltr. Date	Westinghouse Response Letter No.	West. Response Letter Date
480.025	Core debris coolability/mace	07/01/93	ET-NRC-93-3962	09/03/93
480.026	Containment integrity/liner penetration	07/01/93	ET-NRC-93-3962	09/03/93
480.027	Deflagration/detonation of combustible gases	07/01/93	ET-NRC-93-3980	10/04/93
480.028	Hand calculations	07/01/93	ET-NRC-93-3980	10/04/93
480.029	Long-term radial ablation	07/01/93	ET-NRC-93-3962	09/03/93
480.030	Heat removal from core debris	07/01/93	ET-NRC-93-3962	09/03/93
480.031	Water ingress into solidified debris	07/01/93	ET-NRC-93-3962	09/03/93
480.032	Prediction of hydrogen distribution	07/01/93	ET-NRC-93-3980	10/04/93
480.033	Passive autocatalytic recombiners	07/01/93	ET-NRC-93-3962	09/03/93
480.034	Rationale for hydrogen igniter placement	07/01/93	ET-NRC-93-3962	09/03/93
480.035	Localized detonations, DDT mechanisms	07/01/93	ET-NRC-93-3962	09/03/93
480.036	Diffusion flames above IRWST	07/01/93	ET-NRC-93-3980	10/04/93
480.036R01	Diffusion flames above IRWST	/ /		/ /
480.037	Mechanisms for uniform hydrogen distributions	07/01/93	ET-NRC-93-3980	10/04/93
480.038	Igniter placement criteria	11/02/93	NTD-NRC-94-4059	02/03/94
480.039	Igniter coverage of hydrogen source locations	11/02/93	NTD-NRC-94-4059	02/03/94
480.040	Subcompartments without igniters	11/02/93	NTD-NRC-94-4059	02/03/94
480.041	Criteria on igniter separation	11/02/93	NTD-NRC-94-4059	02/03/94
480.042	Igniter electrical power source	11/02/93	NTD-NRC-94-4059	02/03/94
480.043	Structural response/detonation calculations	11/02/93	NTD-NRC-94-4059	02/03/94
480.044	Potential for large hydrogen concentration	11/02/93	NTD-NRC-94-4059	02/03/94
480.045	Igniter reliability given one per room	11/02/93	NTD-NRC-94-4059	02/03/94
480.046	Igniter in Technical Specifications	11/02/93	NTD-NRC-94-4038	01/12/94
480.047	Review of hydrogen experimental databases	11/02/93	NTD-NRC-94-4059	02/03/94
480.048	Equipment survivability in "burn zones"	11/02/93	NTD-NRC-94-4059	02/03/94
952.001	Piping Diagrams	07/28/93	ET-NRC-93-4003	10/27/93
952.002	ADS sparger drawings	08/27/93	ET-NRC-93-3980	10/04/93
952.003	Insulation/heat-tracing	08/27/93	ET-NRC-93-3980	10/04/93

952.004	Starting conditions for depressurization transient	08/27/93	ET-NRC-93-3980	10/04/93
952.005	Primary pump shutoff time	08/27/93	ET-NRC-93-4023	11/30/93
952.006	Test conditions	08/27/93	ET-NRC-93-3980	10/04/93
952.007	Collection of fluids leaving the primary	08/27/93	ET-NRC-93-3980	10/04/93
952.008	Pressurizer heater controls	08/27/93	ET-NRC-93-3980	10/04/93
952.009	Safety valve pressure setting	08/27/93	ET-NRC-93-3980	10/04/93
952.010	Steam generator level control	08/27/93	ET-NRC-93-4023	11/30/93
952.011	Core power during a transient	08/27/93	ET-NRC-93-3980	10/04/93
952.012	Addition of flowmeter to ADS Phase B design	11/02/93	NTD-NRC-94-4059	02/03/94
952.013	Effect of non-condensable gases in test program	11/02/93	NTD-NRC-94-4059	02/03/94
952.014	Applicability of PRHR test to current design	11/02/93	NTD-NRC-94-4059	02/03/94
952.015	ADS Phase B capability to hold constant pressure	11/02/93	NTD-NRC-94-4059	02/03/94
952.016	SPES-2 design documents update	11/02/93	NTD-NRC-94-4059	02/03/94
952.017	Insights from pre-operational SPES-2 tests	11/02/93	NTD-NRC-94-4059	02/03/94
952.017R01	Insights from pre-operational SPES-2 tests	/ /		/ /
952.018	Cold and hot pre-operational data from SPES-2	11/02/93	NTD-NRC-94-4059	02/03/94
952.018R01	Cold and hot pre-operational data from SPES-2	/ /		/ /
952.019	Flow orifices at SPES-2	11/02/93	NTD-NRC-94-4059	02/03/94
952.020	Volume versus elevation for SPES-2	11/02/93	NTD-NRC-94-4059	02/03/94
952.020R01	Volume versus elevation for SPES-2	/ /		/ /
952.021	SGTR analysis for hot and cold side breaks	11/02/93	NTD-NRC-94-4059	02/03/94
952.022	Information gained from ADS Phase A tests	11/02/93	NTD-NRC-94-4059	02/03/94
952.023	Effect of PRHR heat exchanger on ADS operation	11/02/93	NTD-NRC-94-4059	02/03/94
952.024	Test procedures for ADS Phase B testing	11/02/93	NTD-NRC-94-4059	02/03/94
952.025	Analyses for ADS Phases A and B	11/02/93	NTD-NRC-94-4059	02/03/94
952.026	Fluid conditions for ADS Phase B tests	11/02/93	NTD-NRC-94-4059	02/03/94
952.027	RCS behavior versus ADS test facility	11/02/93	NTD-NRC-94-4059	02/03/94
952.027R01	RCS behavior versus ADS test facility	/ /		/ /
952.028	Dynamic reflection wave forces in ADS operation	11/02/93	NTD-NRC-94-4059	02/03/94
952.029	SPES-2 bend/elbow radii	11/30/93	NTD-NRC-94-4059	02/03/94
952.029R01	SPES-2 bend/elbow radii	/ /		/ /

Key:

440	NRR - Reactor Systems Branch
480	NRR - Containment Systems Branch
951	RES (Containment Systems)
952	RES (Reactor Systems)

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AP600 DESIGN AND DESIGN CERTIFICATION TEST PROGRAM OVERVIEW

Table 9 - Summary of NRC Requests for Additional Information (RAI) Related to AP600 Tests and Analysis (cont.)

RAI No.	Description/Issue	NRC Ltr. Date	Westinghouse Response Letter No.	West. Response Letter Date
952.030	SPES-2 valve types and sizes	11/30/93	NTD-NRC-94-4059	02/03/94
952.030R01	SPES-2 valve types and sizes	/ /		/ /
952.031	SPES-2 schematics and drawings update	11/30/93	NTD-NRC-94-4059	02/03/94
952.031R01	SPES-2 schematics and drawings update	/ /		/ /
952.032	SPES-2 operational parameters	11/30/93	NTD-NRC-94-4059	02/03/94
952.033	SPES-2 component position relationships	11/30/93	NTD-NRC-94-4059	02/03/94
952.034	SPES-2 test procedures	11/30/93	NTD-NRC-94-4059	02/03/94
952.035	SPES-2 facility insulation information	11/30/93	NTD-NRC-94-4059	02/03/94
952.035R01	SPES-2 facility insulation information	/ /		/ /
952.036	SPES-2 annular downcomer	11/30/93	NTD-NRC-94-4059	02/03/94
952.037	OSU facility orifice plate information	01/18/94	NTD-NRC-94-4105	04/21/94
952.038	OSU valves with significant flow loss	01/18/94	NTD-NRC-94-4105	04/21/94
952.039	OSU MOV opening/closing rates	01/18/94	NTD-NRC-94-4105	04/21/94
952.040	OSU heater rod power profile	01/18/94	NTD-NRC-94-4105	04/21/94
952.041	OSU drawings LKL930104 & LKL930105	01/18/94	NTD-NRC-94-4105	04/21/94
952.042	Pressurizer Balance Line Piping Diagrams	01/27/94	NTD-NRC-94-4110	04/28/94
952.043	RELAP-5 Thermal Hydraulic Information	01/27/94	NTD-NRC-94-4110	04/28/94
952.044	Reactivity coefficients and check valve info	02/17/94		/ /
952.045	LOCA steady-state and transient assumptions	02/17/94		/ /
952.046	WCOBRA/TRAC results	02/17/94		/ /
952.047	Valve setpoints	02/17/94		/ /
952.048	Fuel rod temperature profiles	02/17/94		/ /
952.049	SPES-2 test conditions	02/24/94	NTD-NRC-94-4105	04/21/94
952.050	SPES-2, Basis for fuel rod stored energy	03/01/94	NTD-NRC-94-4105	04/21/94
952.051	SPES-2, Secondary side mass	03/01/94	NTD-NRC-94-4105	04/21/94
952.052	SPES-2, Basis for pressurizer water level	03/01/94	NTD-NRC-94-4105	04/21/94
952.053	SPES-2, Secondary side conditions	03/01/94	NTD-NRC-94-4105	04/21/94
952.054	SPES-2, Scaling rationale	03/01/94	NTD-NRC-94-4105	04/21/94

952.055	SPES-2, Delayed neutron simulation	03/01/94	NTD-NRC-94-4105	04/21/94
952.056	SPES-2, Basis for heat loss compensation	03/01/94	NTD-NRC-94-4105	04/21/94
952.057	SPES-2, Secondary side relief valve closing setpts	03/01/94	NTD-NRC-94-4105	04/21/94
952.058	SPSE-2, Pump coastdown	03/01/94	NTD-NRC-94-4105	04/21/94
952.059	SPES-2, Pressurizer heater rods	03/01/94	NTD-NRC-94-4105	04/21/94
952.060	ADS, Nominal valve inlet conditions	03/01/94		/ /
952.061	ADS, Nominal control valve area	03/01/94		/ /
952.062	ADS, Nominal control valve mass flow rate	03/01/94		/ /
952.063	ADS, Stage 4, valve train piping dimensions	03/01/94		/ /
952.064	ADS Stage 4, Valve train geometry	03/01/94		/ /

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CHART AP600 DESIGN CERTIFICATION

1994												
JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	JAN

◆ CMT CATEGORY 1 MATRIX TESTS Start: 2/15/94 (2/15/94 Actual)
 End: 6/22/94

CMT CATEGORY 2 MATRIX TESTS Start: 6/27/94
 End: 8/19/94

◆ SPES-2 CATEGORY 1 MATRIX TESTS Start: 2/25/94 (2/5/94 Act)
 End: 9/21/94

SPES-2 CATEGORY 2 MATRIX TESTS Start: 1
 End: 1

OSU CATEGORY 1 MATRIX TESTS Start: 7/1/94
 End: 9/22/94

OSU CATEGORY 2 MATRIX TESTS

ADS PHASE B CATEGORY 2 MATRIX TESTS Start: 7/20/94
 End: 11/1/94

1994												
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1
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1995											
JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC

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ual)
0/10/94
1/22/94

RIX

Start: 10/3/94
End: 2/8/95

94
94

1995											
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