

1.3 COMPARISONS WITH SIMILAR FACILITY DESIGNS

A comparison of the major AP600 design features and nominal parameters with typical two-loop and four-loop Westinghouse plants is provided in Table 1.3-1. The values provided for AP600 are nominal and provided for comparison. Design parameter values for design certification are delineated in the sections referenced. The values provided in Table 1.3-1 for these reference two- and four-loop plants are typical and generally represent more recent plants. The two-loop plant parameters are represented by KRSKO, Napot Point and Ko-Ri (1 and 2), the four-loop by Comanche Peak, Trojan, Vogtle and SNUPPS.

Table 1.3-1 (Sheet 1 of 6)

AP600 PLANT COMPARISON WITH SIMILAR FACILITIES

Systems - Components	DCD §	AP600	Reference 2L	Reference 4L
Plant design objective	1.2	60 yrs	40 yrs	40 yrs
NSSS power	4.0	1,940 MWt	1,882 MWt	3,425 MWt
Core power	4.0	1,933 MWt	1,876 MWt	3,411 MWt
Net electrical output	1.2	600 MWe	620 MWe	1,120 MWe
Reactor operating pressure	5.1	2,250 psia	2,250 psia	2,250 psia
Hot leg temp	5.1	600°F	616° F	618° F
Steam Generator Design pressure	5.4	1200 psia	1100 and 1200 psia	1200 psia
Main feedwater temp	10.3	435° F	430° F	440° F
Core	4.0			
Number fuel assem.		145	121	193
Active fuel length		144 in	144 in	144 in
Fuel assembly array		17 x 17	16 x 16	17 x 17
Fuel rod OD		0.374 in	0.374 in	0.360 in
Number control assem.		45	33	53
- Absorber material		Ag-In-Cd	Ag-In-Cd	Ag-In-Cd
Number gray rod assem.		16	---	---
- Absorber material		SS-304/Ag-In-Cd	---	---
Avg linear power		4.10 kw/ft	5.37 kw/ft	5.44 kw/ft
Heat flux hot channel factor, FQ		2.60	2.34	2.32

Table 1.3-1 (Sheet 2 of 6)

AP600 PLANT COMPARISON WITH SIMILAR FACILITIES

Systems - Components	DCD §	AP600	Reference 2L	Reference 4L
Reactor Vessel	5.3			
Vessel ID		157 in	132 in	173 in
Construction		forged rings	welded plate	welded plate
Number hot leg nozzles		2	2	4
- ID		31.0 in	29.0 in	29.0 in
Number cold leg nozzles		4	2	4
- ID		22.0 in	27.5 in	27.5 in
Number safety injection nozzles		2	2	0
Design fluence		2.0E+19 n/cm ²	5.0E+19 n/cm ²	3.0E+19 n/cm ²
Steam Generators	5.4.2			
Type		vertical U-tube recirc. design	vertical U-tube recirc. design	vertical U-tube recirc. design
Model		Delta-75	D Series/F	D5
Number		2	2	4
Heat transfer area/SG		75,180 ft ²	55,000 ft ²	48,300 ft ²
Number tubes/SG		6,307	5,626	4,568
Tube material		I 690 TT	I 600 TT	I 600 TT
Separate startup feedwater nozzle		Yes	Yes and No	Yes and No
Reactor Coolant Pumps	5.4.1			
Type		canned	shaft seal	shaft seal

Table 1.3-1 (Sheet 3 of 6)

AP600 PLANT COMPARISON WITH SIMILAR FACILITIES

Systems - Components	DCD §	AP600	Reference 2L	Reference 4L
Number	4	2	4	4
Rated HP	≤3,500 hp/pump	7,000 hp/pump	7,000 hp/pump	7,000 hp/pump
Estimated flow/loop	102,000 gpm	102,000 gpm	100,200 gpm	100,200 gpm
Pressurizer	5.4.5			
Total volume	1,600 ft ³	1,000 ft ³	1,800 ft ³	1,800 ft ³
Volume/MWt	0.825 ft ³ /MWt	0.531 ft ³ /MWt	0.526 ft ³ /MW	0.526 ft ³ /MW
Safety valves #/size	2 - 6"	2 - 6"	3 - 6"	3 - 6"
PORV #/size	no	2 - 3"	3 - 3"	3 - 3"
PRT volume	no	1,000 ft ³	1,800 ft ³	1,800 ft ³
Auto depressurization	yes	no	no	no
Turbine Island	10.2			
Turbine - # HP cylinder	1	1	1	1
# LP cylinders	2	2	3	3
Max blade length	47 in	44 in	44 in	44 in
Number reheat stages	1	2	2	2
Feedwater heating stages				
- # LP stages	4	5	5	5
- # HP stages	2	1	2	2
Deaerator	yes	no	no	no
Main feedwater pumps	2 motor driven	3 motor driven	3 turbine driven	3 turbine driven

Table 1.3-1 (Sheet 4 of 6)

AP600 PLANT COMPARISON WITH SIMILAR FACILITIES

Systems - Components	DCD §	AP600	Reference 2L	Reference 4L
Condensate pumps	3	3	3	3
Condenser tube material	Ti	SS	SS	SS
Condensate polishing	33%	0-100%	0-100%	0-100%
Containment	6.2			
Type	steel	steel	steel	pre-stressed concrete
Inside dia.	130 ft	105 ft	105 ft	140 ft
Volume	1.76E+06 ft ³	1.44E + 06 ft ³	1.44E + 06 ft ³	2.80E + 06 ft ³
Volume/MWt	910 ft ³ /MWt	768 ft ³ /MWt	768 ft ³ /MWt	821 ft ³ /MWt
Post accident cooling	air and water on outside of steel containment vessel	Component cooling water cooled fan coolers	Component cooling water cooled fan coolers	Service water cooled fan coolers
Safety Injection	6.3			
Accumulator - #/volume	2/2,000 ft ³	2/2,000 ft ³	2/2,000 ft ³	4/1,350 ft ³
Core makeup tank - #/volume	2/2,000 ft ³	no	no	no
High head pumps - #	none	2	2	2
- runout flow	-	800 gpm	800 gpm	600 gpm
- shutoff head	-	2,000 psi	2,000 psi	1,800 psi
Low head pumps - #	none	see RHR pumps	see RHR pumps	see RHR pumps
Refuel water storage tank - #	1	1	1	1
- location	in containment	ex-containment	ex-containment	ex-containment
- volume	530,000 gal	350,000 gal	350,000 gal	350,000 gal

Table 1.3-1 (Sheet 5 of 6)

AP600 PLANT COMPARISON WITH SIMILAR FACILITIES

Systems - Components	DCD §	AP600	Reference 2L	Reference 4L
Boron inject tank #/vol		no	1/900 gal	1/900 gal
Normal Residual Heat Removal (NRHR)	5.4.7			
Design pressure		900 psig	600 psig	600 psig
Normal RHR pumps - #/design flow		2/1,000 gpm per pump	2/2,200 gpm per pump	2/3,800 gpm per pump
Cooling Water Systems	9.2			
Safety-related		no	yes	yes
Component cooling water pumps		2	4	4
Service water pumps		2	4	4
Heat sink		separate mechanical draft cooling tower	separate mechanical draft cooling towers	separate mechanical draft cooling towers
Startup/Auxiliary Feedwater	10.4			
Motor pumps - #/flow per pump/safety-related		2/380 gpm/no	2/400 gpm/yes	2/600 gpm/yes
Turbine pumps - #/flow		none/-	1/800 gpm	1/1,200 gpm
Passive RHR HX - #/heat removal/safety-related		1/42 MW/Yes	None/-/-	None/-/-
Chemical and Volume Control	9.3.6			
Purification/Letdown flow				
- normal		100 gpm	60 gpm	75 gpm
- max		100 gpm	120 gpm	120 gpm

Table 1.3-1 (Sheet 6 of 6)

AP600 PLANT COMPARISON WITH SIMILAR FACILITIES

Systems - Components	DCD §	AP600	Reference 2L	Reference 4L
Purification location		IRC	ORC	ORC
RCP seal injection/pump		none	8 gpm	8 gpm
Charging pumps		2 @ 100 gpm	2 @ 160 gpm 1 @ 35 gpm	2 @ 150 gpm 1 @ 90 gpm
- SI use		no	no	yes
- safe shutdown use		no	yes	yes
- continuous oper.		no	yes	yes
Boron thermal regeneration		no	yes	yes
Boron recycle evaporator		no	15 gpm	15 gpm
Instrumentation and Control	7.7			
Type I&C system		digital	analog	analog
Type control room		work station	control boards	control boards
Electrical				
Diesels - #	8.31	2	2	2
- safety-related		no	yes	yes
- capacity		4,000 kw	4,600 kw	6,000 kw
1E batteries - total capacity	8.32	28,000 AMP-HR	5,700 AMP-HR	4,800 AMP-HR