

### 1.3 Comparisons with Similar Facility Designs

A comparison of the major U.S. EPR design features and nominal parameters with a typical four-loop pressurized water reactor (PWR) is provided in Table 1.3-1—U.S. EPR Comparison with Similar Facilities. Design parameter values for design certification are delineated in the sections referenced. The values provided in Table 1.3-1 for the reference U.S. EPR and a four-loop plant are typical. The four-loop plant parameters are represented by Callaway Unit 1.

**Table 1.3-1—U.S. EPR Comparison with Similar Facilities**  
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<b>Parameter or Feature</b>	<b>FSAR Chapter/ Section</b>	<b>U.S. EPR</b>	<b>Typical 4-Loop (Callaway Unit 1)</b>
Plant design objective	1.1	60 years	40 years
Rated NSSS thermal power output	1.2, 10.1	4614 MWt	3579 MWt
Reactor core thermal power	1.2, 4.1, 4.3, 4.4, 5.0, 5.1, 15.0	4590 MWt	3565 MWt
Net electrical output	1.1	1600 MWe	1233 MWe
Reactor operating pressure	4.5, 6, 11, and 15	2250 psia	2250 psia
Total reactor flow rate	4.4	184 x 10 <sup>6</sup> lb/hr	139.4 x 10 <sup>6</sup> lb/hr
Reactor coolant temperatures,	4.1, 4.4, 5.1		
Core outlet		626°F	623.7°F
Vessel outlet		625°F	620°F
Core average		597°F	592.2°F
Vessel average		594°F	588.4°F
Core inlet		563°F	556.8°F
Vessel inlet		563°F	556.8°F
Average linear power	4.1, 4.3, 4.4	5.22 kW/ft	5.69 kW/ft
Peak linear power for normal operation	4.1, 4.3, 4.4	13.6 kW/ft	14.22 kW/ft
Heat flux hot channel factor, FQ	4.3	2.6	2.50
Fuel assembly array	4.1, 4.3	17 x 17	17 x 17
Number of fuel assemblies	4.1, 4.3	241	193
Uranium dioxide rods per assembly	4.1, 4.3	265	264
Nominal fuel weight as uranium dioxide	4.1, 4.3	≈324,000 lb (Note 1)	204,280 lb
Number of grids per assembly	4.1, 4.3	10	6 (Zirc-mix), 3 (Zirc-IFM), 2 (Inconel-non mix)

**Table 1.3-1—U.S. EPR Comparison with Similar Facilities**  
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<b>Parameter or Feature</b>	<b>FSAR Chapter/Section</b>	<b>U.S. EPR</b>	<b>Typical 4-Loop (Callaway Unit 1)</b>
Rod cluster control assemblies	4.1, 4.3	89/none	53/none
Number of full/part length assemblies			
Absorber material			
Clad material			
Clad thickness			
Equivalent core diameter	4.1, 4.3	148.3 in	132.7 in
Active fuel length	4.1, 4.3	165.35 in	143.7 in
Number of coolant loops	1.2, 5	4	4
Total steam flow	10.3	20.68 x 10 <sup>6</sup> lb/hr	15.92 x 10 <sup>6</sup> lb/hr
Reactor vessel	5.3, 5.4	192 in	173 in
Inside diameter			
Inlet nozzle inside diameter			
Outlet nozzle inside diameter			
Number of reactor closure head studs			
Reactor coolant pumps	5.4.1	11,801 hp	7,000 hp
Motor Horsepower			
Capacity			
Steam generators	5.4.2	85,681 ft <sup>2</sup>	55,000 ft <sup>2</sup>
Heat transfer area			
Number of U-tubes			

**Table 1.3-1—U.S. EPR Comparison with Similar Facilities**  
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<b>Parameter or Feature</b>	<b>FSAR Chapter/ Section</b>	<b>U.S. EPR</b>	<b>Typical 4-Loop (Callaway Unit 1)</b>
Residual heat removal Initiation pressure Initiation/completion temperature Component cooling water design temperature Cooldown time after initiation Heat exchanger removal capacity	5.4.7, 9.2.2	≈376 psig ≈250°F (Note 2) 212°F (Note 3)/131°F 100.4°F 9.7 hr 31.73 x 10 <sup>6</sup> Btu/hr (Train 1) 30.66 x 10 <sup>6</sup> Btu/hr (Train 2) 30.66 x 10 <sup>6</sup> Btu/hr (Train 3) 31.73 x 10 <sup>6</sup> Btu/hr (Train 4)	≈425 psig ≈350°F /140°F 105°F ≈19.3 hr 39.1 x 10 <sup>6</sup> Btu/hr
Pressurizer Heatup rate using heaters Internal volume	5.4.10	180°F/hr 2649 ft <sup>3</sup>	55°F/hr 1800 ft <sup>3</sup>
Pressurizer safety relief valves Number Maximum relieving capacity	5.4.11	3 793,680 lb/hr	3 420,000 lb/hr
Accumulators Number Operating pressure, minimum Minimum operating water volume, each	6.3	4 638 psig 1236 ft <sup>3</sup>	4 600 psig 810 ft <sup>3</sup>
Medium head safety injection pumps Number Design flow Design head	6.3	4 600 gpm 2260 ft	2 425 gpm 2680 ft

**Table 1.3-1—U.S. EPR Comparison with Similar Facilities**  
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<b>Parameter or Feature</b>	<b>FSAR Chapter/ Section</b>	<b>U.S. EPR</b>	<b>Typical 4-Loop (Callaway Unit 1)</b>
Low head safety injection/ residual heat removal pumps	6.3		
Number		4	2
Design flow		2200 gpm	3800 gpm
Design head		480 ft	350 ft
Chemical and volume control	9.3.4		
Number of centrifugal pumps		2	2
Design flow		176 gpm	150 gpm
Design head		5938 ft	5800 ft
Total seal water supply flow rate, nominal		32 gpm	32 gpm
Total seal water return flow rate, nominal		≈13 gpm	12 gpm
Letdown flow, normal/ maximum		160/480 gpm	75/120 gpm
Charging flow, minimum/ maximum		40/440 gpm	55/100 gpm

**Notes:**

1. The fuel weight in pounds is derived by:  

$$[(\text{nominal metric weight of the fuel assemblies})/0.88] \times 2.2046$$
 Where 0.88 is the mass of uranium in UO<sub>2</sub> and 2.2046 is the conversion factor from kilograms to pounds.
2. Trains 1 and 4.
3. Trains 2 and 3.