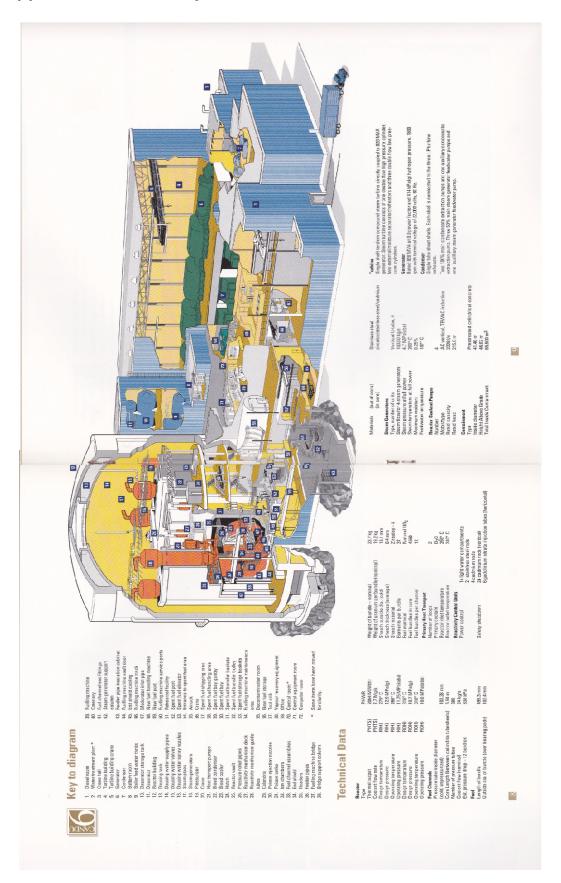
Genealogy of CANDU Reactors: Appendices

prepared by

Dr. Robin Chaplin

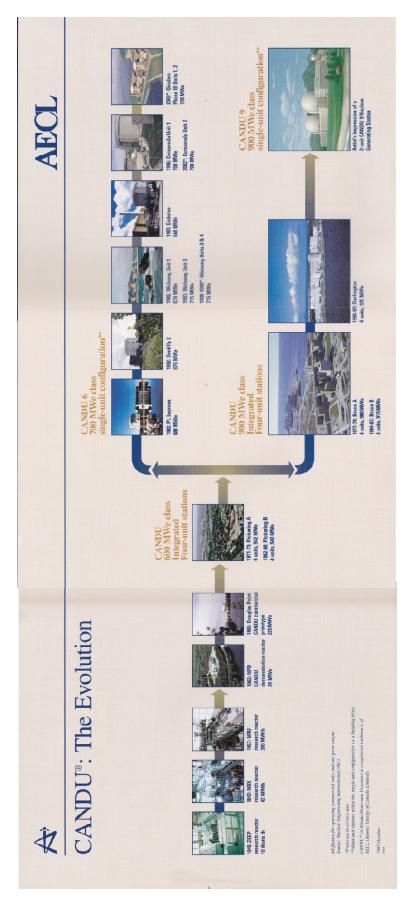
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Appendix A – Cutaway View of CANDU 6 Reactor Plant

Appendix B – CANDU Evolution



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The data presented are typical values for 600 MW and 950 MW CANDU nuclear generating stations. Actual values for a specific customer and site are dependent upon the turbine generator design and condenser cooling water temperature.

Hart Generation in trait Moderator System: 23, 0000 23, 0000 23, 0000 23, 0000 23, 0000 23, 0000 23, 0000 23, 0000 23, 0000 24, 0000 25, 0000 24, 0000 25, 0000 24, 0000 25, 0000 24, 0000 25, 0000 24, 0000 25, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 24, 0000 <t< th=""><th></th><th>WM 008</th><th>2</th><th>950</th><th>950 MW</th><th></th><th>8</th><th>800 MW</th><th>96</th><th>WW 056</th></t<>		WM 008	2	950	950 MW		8	800 MW	96	WW 056
Mark Constrained in Moderator 282, MWMB 302 224, MWRD 318, MWMB 314, MWMB	HEAT GENERATION BALANCE					Moderator System:				
2023 WWIND 31% WWIND 32% WWIND 32 WWIN					- 222	Heat Generated in Moderator	282		123	
2029.7 Within 11,4 Within 12,4 Within 12,4 Within 12,4 Within 12,4 Within 12,4 Within 12,4 Within 12,4 Within 12,4 Within 12,4 Within 14,4 Mithin 14,4 Mithin 14,4 <t< td=""><td>Fission Power Distribution:</td><td></td><td></td><td></td><td></td><td>Heat Generated in Reflector</td><td>4.4</td><td>(HUW(EH)</td><td>8.6</td><td></td></t<>	Fission Power Distribution:					Heat Generated in Reflector	4.4	(HUW(EH)	8.6	
Total Total Title MW(th) Tit	test Generation In:				Second Second	Heat Generated in Calandria Tubes	4.3	(HI)WW	6.7	
T2 WMMIN 12.4 WMMIN 12.6 WMMIN	luel	2029.7 MW			(W(th)	Heat Generated in Guide Tubes		CANADA		
T22 WMM01 182 WMM01 182 WMM01 182 WMM01 182 WMM01 282 WMM01 282 WMM01 282 WMM01 282 WMM01 282 WMM01 282 WMM01 284 WMM01 193 MMM01 193 193 MMM01 193 193 MMM01 193 193 193	sheaths and bundle orructure	1.44 MW	(ua)a		(united	and reactivity mechanisms	4	fundame.	-	INAA.M
Z001.44 WV(10) Z45 Z45 WV(10) Z45 <	Colant Messure Tubes	12.2 MV	(11)	12.5	(u)(u)	Heat from Fuel Channels Heat from Celeodols Shell	63	(un)/ww	n	MVVQF
Total Fastion Heat to Moderator Path MW(h) Total Fastion Heat to Moderator Path MW(h) MW(h)<	reserve constraints)	2061 A MV			MANNA A	and Tubesheets	1.6		2.6	(HUMM
4.3 WWIND 5.6 WWIND 5.6 WWIND 5.7 WWIND 5.0 2.1 MWIND 1 MWIND 1.1 MWIND 5.0 MWIND 5.0 </td <td></td> <td>NH 0 OC</td> <td></td> <td></td> <td>Delices)</td> <td>Total Fission Heat to Moderator</td> <td>8</td> <td>MWW(th)</td> <td>149</td> <td>(HT)VWW</td>		NH 0 OC			Delices)	Total Fission Heat to Moderator	8	MWW(th)	149	(HT)VWW
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Image Image <th< td=""><td>hields, Structures Outside</td><td></td><td>and.</td><td></td><td>and the second</td><td>Heat from Calandria Shell & Tubesheet</td><td>1.9</td><td></td><td>4.6</td><td></td></th<>	hields, Structures Outside		and.		and the second	Heat from Calandria Shell & Tubesheet	1.9		4.6	
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ARTY) Solution	otal Fission Heat	2166.9 MV	63	1.1	(USIND	Outside Calandria/End Shields Heat from Eucl Channels	1		1.5	
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2.4 MW(th) 3.6 MW(th) 0.3 MW(th) 1.0 0.3 MW(th) 1.0 0.3 MW(th) 1.4 0.2 20%6 MW(th) 3.3.3.4 MW(th) 3.3.3.4 MW(th) 3.3.3.4 MW(th) 1.4 9.3 MW(th) 1.4 20%6 MW(th) 3.3.3.4 MW(th) 3.3.3.4 MW(th) 1.4 9.3 MW(th) 1.4 0 MW(th) 3.3.3.4 MW(th) 3.3.4 MW(th) 3.220 MW(th) 3.220 0 MW(th) 3.2.3 MW(th) 3.2.20 MW(th) 3.220 MW(th) 3.220 0 MW(th) 3.2.20 MW(th) 3.2.20 MW(th) 3.2.20 MW(th) 3.2.20 0 MW(th) 3.2.20 MW(th) 3.2.20 MW(th) 3.2.20 MW(th) 3.2.	leat Loss to Moderator	15		2.13	(HUNDA)	Heat from Heat Trans. Piping	0	96-60 S	4.5	
5.4 MW(th) 8.6 MW(th) 8.6 MW(th) 8.6 MW(th) 8.6 MW(th) 9.3 MW(th) 14 2056 MW(th) 3233.4 MW(th) 3233.4 MW(th) 3233.4 MW(th) 3233.4 MW(th) 3233.4 MW(th) 13 3 MW(th) 4.5 MW(th) 4.5 MW(th) 323.4 MW(th) 323.4 MW(th) 323.1 MW(th) 14 6 MW(th) 3.1 MW(th) 13.4 MW(th) 13.4 MW(th) 3220 14 0rs 2047 MW(th) 3220 MW(th) 3220 MW(th) 3220 17 MW(th) 3220 MW(th) 3220 MW(th) 148 2064 MW(th) 3258 MW(th) 3258 MW(th) 14 2064 MW(th) 3258 MW(th) 3250 Heat to Aux. System 9.3 MW(th) 14 2064 MW(th) 3258 MW(th) 3250 Heat to Aux. System 9.3 MW(th) 14	leat Loss to End Shields	17	(III)		(Halwh)	Heat from Moderator Piping	0.3		02	MW(th)
20% Mw(th) 3233.4 Mw(th) 3233.4 Mw(th) 3 Mw(th) 4.5 Mw(th) 3233.4 9 Mw(th) 13.4 Mw(th) 3220 7 Mw(th) 3220 Mw(th) 3220 77 Mw(th) 3220 Mw(th) 3220 77 Mw(th) 3220 Mw(th) 3220 77 Mw(th) 3220 Mw(th) 149 0rs 2064 Mw(th) 3220 Mw(th) 17 Mw(th) 3220 Mw(th) 149 0rs 2064 Mw(th) 3220 9 17 Mw(th) 3220 9 Mw(th) 149 17 Mw(th) 3220 9 MW(th) 149 17 Mw(th) 3250 9 MW(th) 149 18 Mw(th) 3256 MW(th) 149 19 MW(th) 3256 MW(th) 149 14<	otal Heat Loss (Mod. and Shields)		V(tb)		(HillWI)	Net Fission Heat to Aux Svstems	9.9	4.55	14	MWW
3 MW(th) 4.5 MW(th) 4.5 MW(th) 3.3 6 MW(th) 8.3 MW(th) 3.3 MW(th) 3.220 9 MW(th) 3.1.4 MW(th) 3.220 MW(th) 3.220 7 MW(th) 3.220 MW(th) 3.220 MW(th) 3.220 77 MW(th) 3.220 MW(th) 3.220 MW(th) 3.220 77 MW(th) 3.220 MW(th) 3.220 MW(th) 1.49 77 MW(th) 3.220 MW(th) 1.40 9.3 MW(th) 1.49 2064 MW(th) 3.258 MW(th) 3.220 9.3 MW(th) 1.49 2064 MW(th) 3.258 MW(th) 3.320 1.49 2064 MW(th) 3.256 MW(th) 1.49	et Fission Heat to Coolant.				(dt)/Wb		-	- H -		1010
6 MW(th) 8.9 MW(th) 8.4 MW(th) 320 9 MW(th) 13.4 MW(th) 32.0 MW(th) 3220 7 MW(th) 32.0 MW(th) 32.0 MW(th) 3220 17 MW(th) 32 MW(th) 32 MW(th) 3220 2064 MW(th) 32 MW(th) 32 49 2064 MW(th) 32 MW(th) 149 2064 MW(th) 3258 MW(th) 14 2064 MW(th) 3258 MW(th) 14 2064 MW(th) 3258 MW(th) 14	eat Loss to H.T. Piping	3	V(th)		(Ha)WM					
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ors 2047 MW(th) 3220 MW(th) 148 77 MW(th) 325 MW(th) 148 77 MW(th) 325 MW(th) 148 141 Net Fission Heat to Aux. Systems 9.3 MM(th) 148 2064 MW(th) 3258 MW(th) 3258 MW(th) 3394	otal Heat Loss	12	V(th)		(MINNIN)	Net Flasion Heat to Steam Generators	2047	MW(th)	3220	(qt)/v/w
2064 MW(th) 3258 MW(th) 3258 MW(th) 3258 MW(th) 3258 MW(th) 3258 MW(th) 3258 MW(th) 3364	let Fission Heat to Steam Generators				(AIRWA)	Net Fission Heat to Moderator	88.7	MWIth	149	(41)MM
restriction to actual 2084 MW(th) 3258 MW(th) 3258 MW(th) 3364 Total Fleston Heat 2155.9 MW(th) 3364	units crently Appearing or sometime	8	duit		/USDAA	Net Fission Heat to Aux. Systems	5 00 0 00	MWRIN	1	MWCh
	otal measurementary to attach	1511	- 53		(HOWK	Total Fission Heat	2155.9	1070	3394	MW(Ih)
					-					6

Appendix C – Single Unit Station Data (5 pages)

	WW 009	WM 056	L	600 MW	950 MW
HEAT TRANSFER BALANCE (SECONDARY)	DARY)		Weight Total matals of the 15 amount	200	
Net Heat Input to Turbine Cycle Generator Output - Nominal Heat Rejected by T/G	2060.3 MW(th) 675.7 MW(s) 1364.6 MW(th)	3347 MW(th) 1121 MW(e) 2228 MW(th)	Total weight of U in reactor Pellets	84 Mg	136 Mg
IINT ENERGY PALANCE			Quantity (approx /element) Form	30 Cultoritiest nelfate	30 Cultadetral notices
Generator Output (Gross Nominal)	675.7 MW(e)	1121 MW/el		with concave dished ends	with concave dished ends
station Service Power (Estimated) Generator Output (net)	50 MWI(e) 625.7 MWI(e)	alo Miwije) 1031 Mivijej	Diameter (nominal) Stack length (nominal)	12.16 mm 480 mm	12.16 mm 480 mm
EFFICIENCY (TYPICAL)			Element assembly:		
Efficiency of Fission Heat Conservation		94.9%	Material	Zircaloy-4	Zirceloy-4
and remainsion to steam demerators Overall Station Efficiency	(204//4130.9 × 100) 29% /625 7/2155.9 × 100)	(0014%) 30.4% (1031/3394 x 100)	Weight Outside diameter	2.319 kg 13.08 mm	2.319 kg 13.08 mm
	ALL CONTRACTOR	1. N. S.	Bundle assembly:		
REACTOR PHYSICS AND DYNAMICS		100 - 1 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 10	Quantity in reactor	4560	7200
The following data is valid for certain typical conditions assumed in reactor physics	conditions assumed	In reactor physics	Quantity per fuel channel	12	12
design. Actual values are dependent upon design for a specific customer.	design for a specific or	ustomer.	Length of bundle	495 mm	495 mm
Core Data			Outside diameter	102.4 mm	102.4 mm
Number of cells	380	600	BIOLOG IO VIRIAN	The rest	fix eres
	Square	Square	REACTIVITY DEVICE WORTHS		
Corre Radius (Fffartiva)	20.0 UNI 214 % DM	306.9 cm	Total Teas Canted teach	T C mb	0 6 mil.
Core Length	594.4 CM	594.4 cm	Total Adjuster Worth	15 mk	0.1 mk 16.4 mk
Extrapolated Length	606 cm	606 cm	Total Mechanical Control Absorber		
Average menector imickness at Mid Point	ES AN CM	Them	Worth Total Static Moats of Shuboli Links	10.5 mk	7.1 mk
Total Fission Power Total Thermal Power	2180 MW	3394 MW	Total Worth of Poison Injection	600 mk	600 mk
Nominal Channel Power	B.S. MW	6.5 MW	REACTOR BUILDING		
Equilibrium Xenon Losd	Shirt of the second sec	28.2 mk	Form	Upright cylinder	Upright cylinder
Ū				with flat base and double dome	with fiat base and double dome
FUCL			Material	Reinforced pre-	Reinforced pre-
General:			Diameter Insidel	A1 45 m (136 H)	Stressed concrete 52.0 m (170.40
Fuel	Compacted and sintered natural	Compacted and sintered natural	(Outside University Holinhi IBasement to Inside	43.59 m (143 ft)	54.2 m (178 tt)
	UO ₂ pellets	UO ₂ pellets	top of dome	51.21 m (168 ft)	64.5 m (212 ft)
Form	Fuel bundle	Fuel bundle	Design Pressure	124.1 kPa(g)	138 kPa(g)
	assembly of 37 elements	37 elements	Wall thickness	(16 perg) 1.07 m (3.5 ft)	(20 psig) 1.1 m (3.6 H)

	600 MW	MW 056		600 MW	ANN NOR
Reactor Containment			FUEL CHANNEL ASSEMBLIES		
Net Building Air Volume	48 477 m ³ (1 712 000 ft ⁸)	106 000 m ³ (3 743 000 ft3)	Quantity 1 enorth:	380	600
Base stab thickness	1.68 m (5.61 ft)	3m (9.84 ft)	Overall including and fittings	10.82 m (35.5 tt)	11.15 m (36.6 ft)
Wall height (not incl. dome)	423 m (138.8 ft)	54.0 m (177.2 H)	Channel Flow (maximum)	24 kg/s	26.5 kg/s
Frickness of gome at grown. Ring beam thickness	2.20 m (7.2 th)	1.9 m (8.2 fb)		(180 000 IPW)	(210 000 (b/h)
Ring beam height	4.3 m (14.1 ft)	4.3 m (14.1 ft)	Inlet temperature	266.6°C (511.8°F)	266.2°C (513.1°F)
Internal dome thickness	0.39 m (1.25 H)	0.4 m (1.3 ft)	Outliet tomporature	11.04 MPa(a)	314.17 MPa(a)
REACTOR				(1601 psia)	(1620 psia)
Tomp	Horizontal press-	Horizontal orese-	Outlet pressure*	10,3 MPa(a) /1494 neisi	10.29 MPa(a)
and to	ure tube	ure tube	Pressure Tubes	famout subarts	
coolant:	Pressurized	Pressurized besiv water (D.C)	Quentity	380	600
Moderator	Heavy Water (D ₂ 0)	Heavy Water (D ₂ 0)	Metsrial	Zirconlum/	Zirconiom/
Inter Temperature	49°C (120°F)	51°C (123°F)	I anoth Trimmad for lostalistion	NODIUM AND	Active Dimoniki
Nuclerator Flow Pate	940 US	2200 US	(approx.)	6.30 m (20.66 ft)	6.32 m (20.75 ft)
	(12 400 lgpm)	(mdb) 000 (gpm)	Inside Diameter, Minimum	103.38 mm (4.07 in)	104 mm (4.09 in)
Cooling Capacity	120 MW(th)	156 MW(th)	Wall Thickness, Minimum	4.19 mm (0.165 in)	100000 000000 000000000000000000000000
Fuel Number of Channels	380	Ratural UC2 600	CTCAN CENEBATORS		
			SICAM GENERALONS	のためではないのないという言語	
Reactivity Control:	14-17-14-12-14-14-14-14-14-14-14-14-14-14-14-14-14-	Beerloof - 10-0410-0210	Name	Primary Heat Trans- nort Sustein Steam	Primary Heat Trans- nort System Steam
Main Method	On power re-	On power re-		Generator	Generator
	moderator polson	moderator poison	Quantity	*	80
	control	control	Type	Vertical U-tube	Vertical U-tube
Trim	H ₂ O zone control accemblice and	H ₂ O zone control accemblias and		with integral steam drams and	with integral steam drums and
	vertical control	vertical control		preheater	preheater
Delene Consiste	absorber rods Venical adjustere	absorber rods Vartical artitetar	Heat transferred"	2064 MW(th)	3258 MW/th)
	sport and a sector and	rods	Heat transier area per steam generator	312/ m*	(33 000 ft ²)
Shutdown:	C. S. STORE		Fluid	D'O	Dio
System no. 1	Spring-augmented	Spring-sugmented	Flow Rate" .	7.6 Mg/s	13.5 Mg/s
	gravity-accelerated shutoff rods	gravity-accelerated shutoff rods	Shell Side Data:	(Ulai ant X sing)	Unit & LOUIS
System no. 2	Moderator poison.	Moderator polson	Fluid	D,H	H ₂ O
	Injection	injection	Steam Flow**	1.047 Mg/s	1.612 Mg/s
Flux Flattening:	1.000 A. 100 A. 100 A. 100 A. 100 A.	and the second se	Feedwater Flow"*	959 kg/s	1536 kg/s
Actist	Vertical adjuster	Vertical adjuster		(7.615 x 10 ⁶ lb/h)	(12.19 × 10 ⁶ (b/h)
Radial	rode Differential fuelling	Differential fuelling	Blowdown Flow** (continuous)	1.00 kg/s (accon th/h)	2.0 kg/s rt5 e00 lb/hi
	and vertical	and vertical	 Maximum measure shared at 100% measure (mpassing) 	in the second of fuely	and the second
Elize Control	adjuster rods H-O Zone Control	adjuster roots H ₂ O Zone Control	 total for four steam generators (800 MW) total tor eight steam generators (850 MW) 	W) total for eight steam	generators (BS0 MW)

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	WW 009	950 MW		600 MW	950 MW
Feedwater inlet temperature Pressure at drum nozzle.	187°C (363°F) 4.69 MPa(a) (881 psia)	177°C (350°F) 5.07 MPa(a) (736 psia)	Poison	Gadolinium nitrate in D ₂ O (B000ppm solution)	Gadolinium nitrate In D ₂ O (9000ppm solution)
Temperature at drum nozzlé Quality at drum nozzlé	260°C (500°F) 99.75%	265°C (509°F) 99.75%	Reactivity worth Short term (after 2 sec.) Long term (after 1 min.)	-55 mk (min.) -300 mk (min.)	
HEAT TRANSPORT PUMPS Quantity Type	4 Vertical, centrifugal, single suction double discheme	4 Ventical, centrifugal, single suction double discharce	Liquid Zone Control Units Quantity	6 (4 x 2 compart ments and 2 x 3	8 (4 x 3 compart- ments and 4 x 2
Duty Fluid Flow Rate Temperature Head		Continuous DyO 3859 Lts (52 256 ligpm) 286°C (511°P) 245 m (803 ft)	Reactivity Worth, approx. maximum Type	 - 7.5 millik - 7.5 millik Vertical through: tubes, divided into compartments that can be partially or completely filled 	- accompactmentay - at,1 millt-k Vertical through- tubes, divided into compartments that can be partiality or completely filled
REACTIVITY CONTROL Shut-Off Units (Shutdown System No. 1) Quantity Shutoff Rods:	8	8	Mechanical Control Absorber Units Absorber Rods. Quantity Type	wirringen water. 4 Stainless steel-clad cadmium tube	with right water. 4 Stainless steel-clad cadmium tube
uence		Stainless steel-clad cadmium tube Simultaneous drop, spring augmented,	Insertion Sequence + Method: Reactor Stepback	Simultaneous, free drop, gravity acceleration	Simultaneous, free drop, gravity acceleration
Static Reactivity Worth, approx.	9750055	gravity-accelerated -67.3 milli-k (36 rods)	Reactor Setback Withdrawal Sequence + Method	Simultaneous, motor driven Simultaneous,	Simultaneous motor driven Simultaneous
Drive Mechanism: Rod Insertion mechanism Dool duratestion sustem	Free-wheeling winch and cable Betary hydrautic	Free-wheeling winch and cable Rotary fivefraulic	Insertion & Withdrawal Time Reactivity Worth, approx.	motor driven Variable (130 sec minimum) -10 militi-k	Motor orwan Variable (150 sec minimum) -7.3 militik
Withdrawal mechanism	damper on winch Motor & gear train engaged to winch by a dc electro- riagnetic friction	damper on winch Motor & gear train engaged to winch by a do electro- magnetic friction	Adjuater Units Quantity Absorber Element: Type	21 Variable thickness tube plus centre	27 Variable thickness tube plus centre
Liquid Injection Shutdown System (Shutdown System No. 2) Quantity Type	6 Horizontal nozzle tubes inject liquid potson directly into moderator when svotem is actuated	8 Horizontal nozzle tubes inject inquid polson directly into polson directly into system is actuated	Material Withdrawal and Insertion Sequence Withdrawal or Insertion Time, Each Bank Poison Override Time Total Peactivity Worth, approx.	rod Stainless Steel 1 bank at a time 60 ± 5 seconds 30 minutes - 15 militk	rod Stainless Stees 1 bank at a time 60 ± 5 seconds 30 minutes - 16.4 milli-k

Moderator Liquid Poison System	00000000	ALL DOR		6 H M	and here
Long Term Reactivity Control:	Borto Ashrodoldo	Boein Anthurfèide	Hortzontal Flux Detector Units No. of Assembles. Type	7 Factory sealed,	14 Factory sealed,
Solubility Limit in D ₂ 0		Securitaria Success		encapsulated, multi-detector	encapsulated, multi-detector
at 20°C (68°F)	27 g/L	2/ B/L		assembly; self-	assembly; self-
concentration or acroin in the Moderator to simulate -28.5 mk*	3.5 ppm	3.5 ppm		powered, platinum and variadium detectors	powered, platinum and vanadium detectors
Concentration of Poison In the Poison Tank Bate of Poison Solution	10.56 g/L	10.56 g/L	TURBINE GENERATOR AND AUXILIARIES	LRIES	
Addition to Achieve -0.75 mk/min	117 mL/s (1.54 (gpm)	170 mLis (2.24 lgpm)	Design temperature of circulating water 22°C (71.6°F) Generator gross output	675.7 MW(e)	1121 MWV(e)
Startup Reactivity Control: Poison	Gadolinium Nitrate Hexahydrate	Gadolinium Nitrate Hexahydrate	Turbine cycle heat rate Steam cycle gross efficiency Main edam from MCB	10 937 kJ/kWh 32.8% 1047 kots	10.460 kJ/KWh 34,4% 1612 ko/a
Solubility Limit in D ₂ O at 25°C (77°F).	2.35 kalt	2.36 kg/t		(8,310 × 10 ⁴ lb ¹ h)	(12 794 x 103 lbih)
Concentration of Gadolinium in the Moderator to Simulate -28.5mk*	0.83 ppm	mpg 68.0	Live steam flow to valves	957 kg/s	1532.5 kg/s 77.5 kole/2nd Street
Concentration of Poison in the Poison Tank	3.99 g/L	3.99 g/L	Live steam tiow to reneater Live steam pressure at valves	data kgra 4,55 MPa(a) MMD reis)	4,83 MPa(a) (715 msia)
Pate of Poison Solution Addition to Achieve -0.75 mkmin	78,1 mUs (1.03 tapm)	113 mL/s (1.48 igpm)	Live stearn temperature at valves Pressure of HP exhaust steam	258°C (496.6°F) 865.3kPa(a) (96.5 pala)	263°C (505.4°F) 545.4 kPa(a) (79.1 psia)
Vertical Flux Detector Units No. of Assemblies	8	28 Contant sector	Quality of HP exhaust steam Inlet pressure of LP steam	B9.24% 588.4 kPa(a) (85.3 psia)	86.5% 500 kPa(a) (72.6 psia)
	eractor searce, encapeulated, multi-detector assembly; self-powered, platinum and vsnadium detectors	ractory searce, multi-defector assembly; self-powered vanadium datectors	Inlet temperature of LP steam Quality of LP exhaust steam Turbine generator speed Number of HP cyclinders Number of LP cylinders	242.2C (468.68°F) 89.5% 1800 rpm 1, double flow 3, double flow	247.4°C (477.3°F) 91.0% 1800 rpm 1, double flow 3, double flow
			Number of moisture separators Number of reheaters Numbers and diameter of steam inlets Generator Type	2 4 x 61 cm (4 x 24 in) Direct coupled.	2 4 x 61 cm (4 x 24 in) Direct coupled,
 -28.5 mk is the reactivity required to compensate for complete absence of equilibrium xenon in the reactor fuel. 	ompensate for complete a	absence of equilibrium		hydrogen/water cooled	hydrogen/water cooled
			210		