

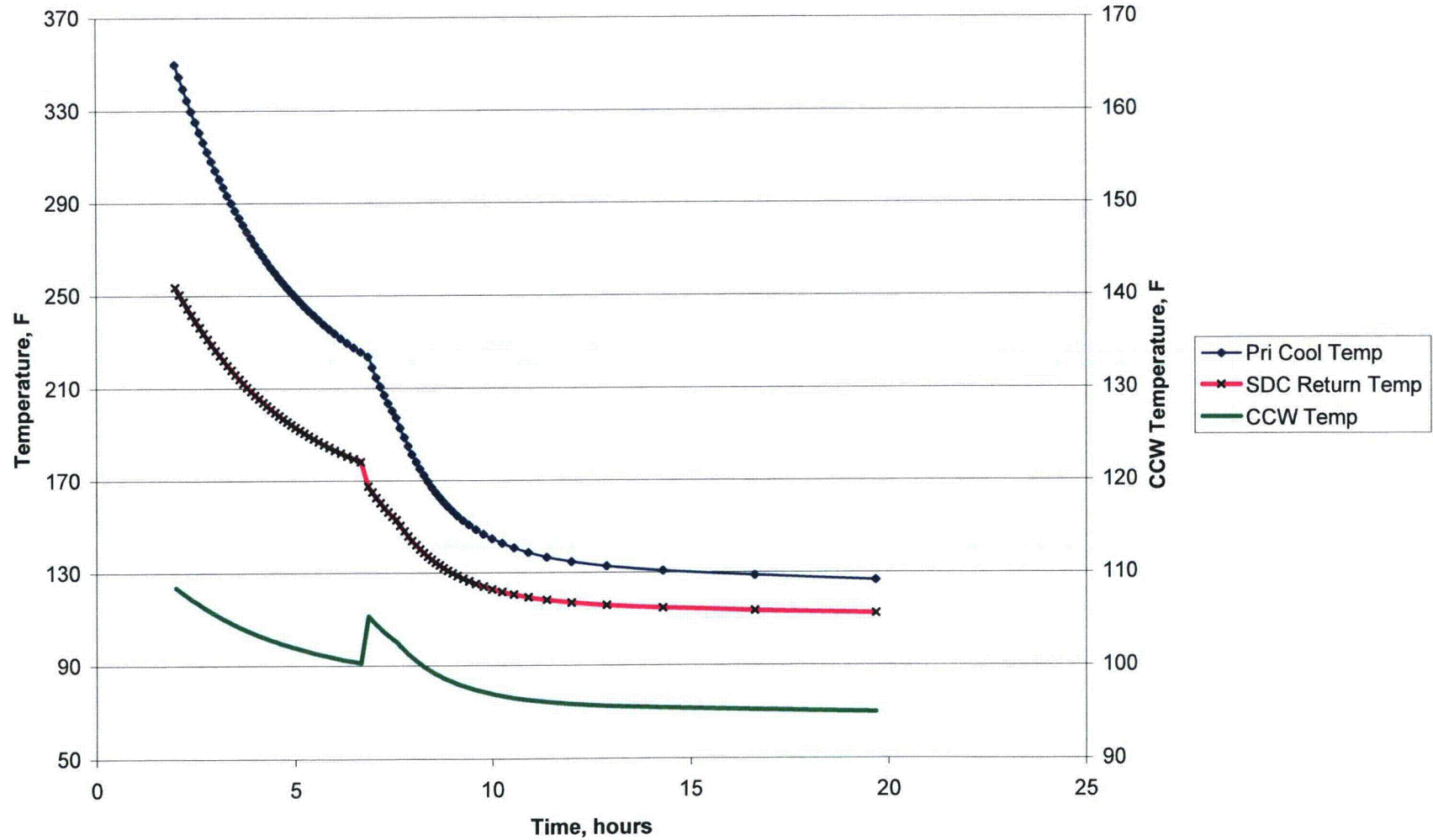
Time	Step	Q(D)	P(pp)	Pscd	Total Q	dTrc	No SDC Hx	SDCHx (per exchanger)							
								Tube				Shell			
								Q, gpm	Pi	Tt,i	Tt,o	Q, gpm	Pi	Ts,i	Ts,o
hrs	hrs	mmBtu/hr			degF/hr										
7.76	0.10	35,465	1.5	-39.42	-41.88	-38.07	2	2000	315	188.68	147.99	3254	95	101.65	126.14
7.86	0.10	35,318	1.5	-37.86	-38.90	-35.37	2	2000	315	184.87	145.85	3254	95	101.25	124.76
7.96	0.10	35,175	1.5	-36.41	-36.15	-32.86	2	2000	315	181.34	143.84	3254	95	100.87	123.48
8.06	0.10	35,033	1.5	-35.06	-33.60	-30.54	2	2000	315	178.05	141.98	3254	95	100.52	122.29
8.16	0.10	34,894	1.5	-33.81	-31.23	-28.40	2	2000	315	175.00	140.24	3254	95	100.20	121.19
8.26	0.10	34,757	1.5	-32.65	-29.05	-26.41	2	2000	315	172.16	138.63	3254	95	99.89	120.16
8.36	0.10	34,622	1.5	-31.57	-27.02	-24.57	2	2000	315	169.52	137.12	3254	95	99.61	119.20
8.46	0.10	34,489	1.5	-30.57	-25.15	-22.86	2	2000	315	167.06	135.72	3254	95	99.34	118.31
8.56	0.10	34,359	1.5	-29.63	-23.41	-21.28	2	2000	315	164.77	134.41	3254	95	99.10	117.49
8.66	0.10	34,230	1.5	-28.77	-21.80	-19.82	2	2000	315	162.64	133.19	3254	95	98.87	116.72
8.76	0.11	34,102	1.5	-27.95	-20.30	-18.45	2	2000	315	160.64	132.04	3254	95	98.65	115.99
8.87	0.12	33,967	1.5	-27.14	-18.80	-17.09	2	2000	315	158.64	130.89	3254	95	98.44	115.27
8.99	0.13	33,824	1.5	-26.32	-17.32	-15.74	2	2000	315	156.64	129.74	3254	95	98.22	114.55
9.12	0.14	33,671	1.5	-25.51	-15.84	-14.40	2	2000	315	154.64	128.58	3254	95	98.01	113.82
9.26	0.15	33,507	1.5	-24.69	-14.38	-13.07	2	2000	315	152.64	127.43	3254	95	97.79	113.10
9.41	0.17	33,330	1.5	-23.88	-12.93	-11.75	2	2000	315	150.64	126.27	3254	95	97.57	112.38
9.58	0.19	33,137	1.5	-23.07	-11.50	-10.45	2	2000	315	148.64	125.11	3254	95	97.36	111.66
9.77	0.22	32,926	1.5	-22.25	-10.08	-9.17	2	2000	315	146.64	123.95	3254	95	97.14	110.94
9.99	0.25	32,692	1.5	-21.44	-8.69	-7.90	2	2000	315	144.64	122.79	3254	95	96.92	110.21
10.24	0.30	32,429	1.5	-20.63	-7.33	-6.67	2	2000	315	142.64	121.63	3254	95	96.70	109.49
10.54	0.37	32,128	1.5	-19.82	-6.02	-5.47	2	2000	315	140.64	120.47	3254	95	96.49	108.77
10.91	0.46	31,776	1.5	-19.01	-4.75	-4.32	2	2000	315	138.64	119.30	3254	95	96.27	108.05
11.37	0.62	31,352	1.5	-18.20	-3.55	-3.23	2	2000	315	136.64	118.13	3254	95	96.05	107.33
11.99	0.89	30,820	1.5	-17.40	-2.47	-2.25	2	2000	315	134.64	116.96	3254	95	95.83	106.61
12.88	1.41	30,115	1.5	-16.59	-1.56	-1.42	2	2000	315	132.64	115.79	3254	95	95.61	105.89
14.29	2.34	29,121	1.5	-15.78	-0.94	-0.86	2	2000	315	130.64	114.62	3254	95	95.39	105.17
16.63	3.05	27,730	1.5	-14.98	-0.72	-0.65	2	2000	315	128.64	113.44	3254	95	95.18	104.45
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73
19.68	0.00	26,260	1.5	-14.17	-0.58	-0.53	2	2000	315	126.64	112.27	3254	95	94.96	103.73





**Shutdown Cooling Temperature Transient with 90F River Water**  
**SDC Hx Fouling = 0.00418 hr-F-sqft/Btu, CCW Hx Fouling = 0.0015 hr-F-sqft/Btu**

Second SDC HX Started at 225F Primary Coolant



Shutdown Cooling Temperature Transient with 90F River Water											SDC											
Hx Fouling = 0.00418 hr-F-sqft/Btu, CCW Hx Fouling = 0.004 hr-F-sqft/Btu																						
Initial RC Temperature, F											350		SDC HX		CCW HX							
Initial Time											2		2754		Shell Film Multiplier		0.09751					
RCS Temperature after 8 hours											199.82				Shell Film Re power		0.61709					
Time after trip to 130F Primary Coolant Temp											18.19		Initial CCW to SDCHx		4246		Shell Film Pr power		0.333			
Time after SDC initiation to 130F PC Temp											16.2		CCW Flow Step Temp		275		Fouling (total = tube side)		0.00418		0.004	
Decay heat equilibrium at 90F river temp											0.00		2 HX Temp		225				0.00418		0.004	
											SDCHx (per exchanger)											
Time	Step	Q(D)	P(pp)	P(sdc)	Total Q	dTrc	No SDC Hx	Tube				Shell										
hrs	hrs	mmBtu/hr			degF/hr	Q, gpm	Pi	Tt,i	Tt,o	Q, gpm	Pi	Ts,i	Ts,o									
2.00	0.1	54.966	19.5	-128.17	-53.70	-48.82	1	3000	315	350.00	256.85	4246	95	116.79	178.27							
2.10	0.10	54.107	19.5	-125.73	-52.13	-47.39	1	3000	315	345.12	253.90	4246	95	116.33	176.62							
2.20	0.10	53.300	19.5	-123.37	-50.57	-45.97	1	3000	315	340.38	251.04	4246	95	115.88	175.03							
2.30	0.10	52.540	19.5	-121.07	-49.03	-44.57	1	3000	315	335.78	248.25	4246	95	115.45	173.48							
2.40	0.10	51.822	19.5	-118.84	-47.52	-43.20	1	3000	315	331.32	245.55	4246	95	115.03	171.98							
2.50	0.10	51.143	19.5	-116.68	-46.04	-41.85	1	3000	315	327.00	242.92	4246	95	114.62	170.52							
2.60	0.10	50.500	19.5	-114.59	-44.59	-40.54	1	3000	315	322.82	240.37	4246	95	114.22	169.11							
2.70	0.10	49.888	19.5	-112.56	-43.17	-39.25	1	3000	315	318.77	237.89	4246	95	113.84	167.74							
2.80	0.10	49.305	19.5	-110.60	-41.79	-37.99	1	3000	315	314.84	235.49	4246	95	113.46	166.41							
2.90	0.10	48.749	19.5	-108.69	-40.44	-36.77	1	3000	315	311.04	233.16	4246	95	113.10	165.13							
3.00	0.10	48.218	19.5	-106.85	-39.13	-35.58	1	3000	315	307.36	230.91	4246	95	112.75	163.89							
3.10	0.10	47.710	19.5	-105.07	-37.86	-34.42	1	3000	315	303.81	228.72	4246	95	112.41	162.69							
3.20	0.10	47.223	19.5	-103.35	-36.62	-33.29	1	3000	315	300.36	226.60	4246	95	112.08	161.52							
3.30	0.10	46.756	19.5	-101.68	-35.42	-32.20	1	3000	315	297.04	224.55	4246	95	111.76	160.40							
3.40	0.10	46.307	19.5	-100.07	-34.26	-31.14	1	3000	315	293.82	222.56	4246	95	111.45	159.31							
3.50	0.10	45.876	19.5	-98.50	-33.13	-30.12	1	3000	315	290.70	220.63	4246	95	111.15	158.26							
3.60	0.10	45.460	19.5	-97.00	-32.04	-29.12	1	3000	315	287.69	218.77	4246	95	110.86	157.24							
3.70	0.10	45.059	19.5	-95.54	-30.98	-28.16	1	3000	315	284.78	216.96	4246	95	110.58	156.25							
3.80	0.10	44.673	19.5	-94.13	-29.95	-27.23	1	3000	315	281.96	215.21	4246	95	110.31	155.30							
3.90	0.10	44.300	19.5	-92.76	-28.96	-26.33	1	3000	315	279.24	213.52	4246	95	110.05	154.38							
4.00	0.10	43.939	19.5	-91.44	-28.00	-25.46	1	3000	315	276.61	211.88	4246	95	109.79	153.49							
4.10	0.10	43.590	19.5	-90.17	-27.08	-24.61	1	3000	315	274.06	210.29	4246	95	109.55	152.63							
4.20	0.10	43.252	19.5	-88.93	-26.18	-23.80	1	3000	315	271.60	208.76	4246	95	109.31	151.80							
4.30	0.10	42.924	19.5	-87.74	-25.32	-23.01	1	3000	315	269.22	207.27	4246	95	109.08	150.99							
4.40	0.10	42.606	19.5	-86.59	-24.48	-22.25	1	3000	315	266.92	205.83	4246	95	108.86	150.21							
4.50	0.10	42.298	19.5	-85.47	-23.67	-21.52	1	3000	315	264.69	204.44	4246	95	108.64	149.46							
4.60	0.10	41.999	19.5	-84.39	-22.89	-20.81	1	3000	315	262.54	203.09	4246	95	108.43	148.73							
4.70	0.10	41.708	19.5	-83.35	-22.14	-20.13	1	3000	315	260.46	201.79	4246	95	108.23	148.03							
4.80	0.10	41.425	19.5	-82.34	-21.42	-19.47	1	3000	315	258.44	200.52	4246	95	108.03	147.35							
4.90	0.11	41.143	19.5	-81.34	-20.70	-18.82	1	3000	315	256.44	199.27	4246	95	107.84	146.67							
5.01	0.11	40.859	19.5	-80.34	-19.98	-18.16	1	3000	315	254.44	198.01	4246	95	107.64	145.99							
5.12	0.11	40.573	19.5	-79.34	-19.26	-17.51	1	3000	315	252.44	196.75	4246	95	107.45	145.32							
5.23	0.12	40.285	19.5	-78.33	-18.55	-16.86	1	3000	315	250.44	195.49	4246	95	107.25	144.64							
5.35	0.12	39.994	19.5	-77.33	-17.84	-16.22	1	3000	315	248.44	194.23	4246	95	107.06	143.96							
5.48	0.13	39.701	19.5	-76.33	-17.13	-15.57	1	3000	315	246.44	192.97	4246	95	106.86	143.29							
5.60	0.13	39.405	19.5	-75.33	-16.43	-14.93	1	3000	315	244.44	191.70	4246	95	106.67	142.61							
5.74	0.14	39.105	19.5	-74.33	-15.72	-14.29	1	3000	315	242.44	190.44	4246	95	106.47	141.93							
5.88	0.15	38.802	19.5	-73.33	-15.03	-13.66	1	3000	315	240.44	189.17	4246	95	106.28	141.26							
6.02	0.15	38.495	19.5	-72.33	-14.33	-13.03	1	3000	315	238.44	187.91	4246	95	106.08	140.58							
6.18	0.16	38.183	19.5	-71.33	-13.64	-12.40	1	3000	315	236.44	186.64	4246	95	105.89	139.91							
6.34	0.17	37.866	19.5	-70.33	-12.96	-11.78	1	3000	315	234.44	185.37	4246	95	105.69	139.23							
6.51	0.18	37.545	19.5	-69.33	-12.28	-11.16	1	3000	315	232.44	184.10	4246	95	105.49	138.55							
6.69	0.19	37.217	19.5	-68.33	-11.61	-10.55	1	3000	315	230.44	182.83	4246	95	105.30	137.88							
6.88	0.20	36.882	19.5	-67.33	-10.94	-9.95	1	3000	315	228.44	181.56	4246	95	105.10	137.20							
7.08	0.21	36.540	19.5	-66.33	-10.29	-9.35	1	3000	315	226.44	180.28	4246	95	104.91	136.52							
7.29	0.11	36.191	19.5	-51.25	-46.81	-42.55	2	2000	315	224.44	170.95	3254	95	111.92	143.85							
7.40	0.10	36.021	19.5	-49.47	-43.42	-39.47	2	2000	315	219.89	168.33	3254	95	111.23	142.05							
7.50	0.10	35.865	19.5	-47.92	-40.48	-36.80	2	2000	315	215.95	166.06	3254	95	110.64	140.48							
7.60	0.10	35.712	19.5	-46.46	-37.76	-34.32	2	2000	315	212.27	163.94	3254	95	110.09	139.03							
7.70	0.10	35.561	19.5	-45.14	-35.22	-32.02	2	2000	315	208.83	161.95	3254	95	109.57	137.67							
7.80	0.10	35.413	19.5	-43.89	-32.86	-29.88	2	2000	315	205.63	160.10	3254	95	109.09	136.40							
7.90	0.10	35.268	19.5	-42.72	-30.67	-27.89	2	2000	315	202.64	158.37	3254	95	108.63	135.22							





Time	Step	Q(D)	P(pp)	Pcdc	Total Q	dTrc	No SDC Hx	SDCHx (per exchanger)							
								Tube				Shell			
								Q, gpm	Pi	Tt,j	Tt,o	Q, gpm	Pi	Ts,j	Ts,o
hrs	hrs	mmBtu/hr			degF/hr										
8.00	0.10	35.125	1.5	-41.63	-46.64	-42.40	2	2000	315	199.86	156.75	3254	95	108.21	134.11
8.10	0.10	34.984	1.5	-39.98	-43.47	-39.52	2	2000	315	195.62	154.28	3254	95	107.57	132.43
8.20	0.10	34.846	1.5	-38.43	-40.52	-36.84	2	2000	315	191.66	151.97	3254	95	106.97	130.87
8.30	0.10	34.710	1.5	-37.00	-37.78	-34.35	2	2000	315	187.98	149.81	3254	95	106.41	129.41
8.40	0.10	34.575	1.5	-35.66	-35.24	-32.04	2	2000	315	184.55	147.80	3254	95	105.88	128.05
8.50	0.10	34.444	1.5	-34.41	-32.88	-29.89	2	2000	315	181.34	145.91	3254	95	105.40	126.78
8.60	0.10	34.314	1.5	-33.25	-30.68	-27.89	2	2000	315	178.35	144.15	3254	95	104.94	125.60
8.70	0.10	34.186	1.5	-32.16	-28.64	-26.03	2	2000	315	175.56	142.51	3254	95	104.51	124.49
8.80	0.10	34.060	1.5	-31.15	-26.74	-24.31	2	2000	315	172.96	140.97	3254	95	104.11	123.46
8.90	0.10	33.936	1.5	-30.20	-24.97	-22.70	2	2000	315	170.53	139.53	3254	95	103.74	122.50
9.00	0.10	33.813	1.5	-29.32	-23.33	-21.21	2	2000	315	168.26	138.19	3254	95	103.39	121.60
9.10	0.10	33.693	1.5	-28.50	-21.81	-19.82	2	2000	315	166.14	136.93	3254	95	103.07	120.76
9.20	0.11	33.573	1.5	-27.72	-20.37	-18.52	2	2000	315	164.14	135.74	3254	95	102.76	119.97
9.31	0.12	33.447	1.5	-26.95	-18.95	-17.23	2	2000	315	162.14	134.55	3254	95	102.45	119.18
9.42	0.13	33.313	1.5	-26.17	-17.53	-15.94	2	2000	315	160.14	133.36	3254	95	102.15	118.39
9.55	0.14	33.171	1.5	-25.40	-16.13	-14.66	2	2000	315	158.14	132.16	3254	95	101.84	117.60
9.69	0.15	33.019	1.5	-24.62	-14.73	-13.39	2	2000	315	156.14	130.97	3254	95	101.53	116.81
9.84	0.16	32.856	1.5	-23.85	-13.35	-12.13	2	2000	315	154.14	129.77	3254	95	101.22	116.02
10.00	0.18	32.680	1.5	-23.08	-11.98	-10.89	2	2000	315	152.14	128.57	3254	95	100.91	115.23
10.18	0.21	32.489	1.5	-22.31	-10.62	-9.66	2	2000	315	150.14	127.38	3254	95	100.60	114.44
10.39	0.24	32.278	1.5	-21.53	-9.29	-8.45	2	2000	315	148.14	126.17	3254	95	100.30	113.65
10.63	0.28	32.044	1.5	-20.76	-7.98	-7.26	2	2000	315	146.14	124.97	3254	95	99.99	112.87
10.90	0.33	31.780	1.5	-19.99	-6.70	-6.09	2	2000	315	144.14	123.77	3254	95	99.68	112.08
11.23	0.40	31.477	1.5	-19.22	-5.47	-4.97	2	2000	315	142.14	122.56	3254	95	99.37	111.29
11.63	0.51	31.121	1.5	-18.45	-4.28	-3.89	2	2000	315	140.14	121.36	3254	95	99.06	110.50
12.15	0.69	30.690	1.5	-17.68	-3.18	-2.89	2	2000	315	138.14	120.15	3254	95	98.75	109.71
12.84	1.01	30.145	1.5	-16.92	-2.19	-1.99	2	2000	315	136.14	118.94	3254	95	98.44	108.93
13.85	1.60	29.419	1.5	-16.15	-1.38	-1.25	2	2000	315	134.14	117.73	3254	95	98.13	108.14
15.45	2.55	28.399	1.5	-15.38	-0.86	-0.78	2	2000	315	132.14	116.51	3254	95	97.82	107.36
17.99	3.15	27.031	1.5	-14.61	-0.70	-0.63	2	2000	315	130.14	115.30	3254	95	97.51	106.57
21.15	4.07	25.658	1.5	-13.85	-0.54	-0.49	2	2000	315	128.14	114.08	3254	95	97.20	105.78
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00
25.22	0.00	24.239	1.5	-13.08	-0.43	-0.39	2	2000	315	126.14	112.87	3254	95	96.89	105.00

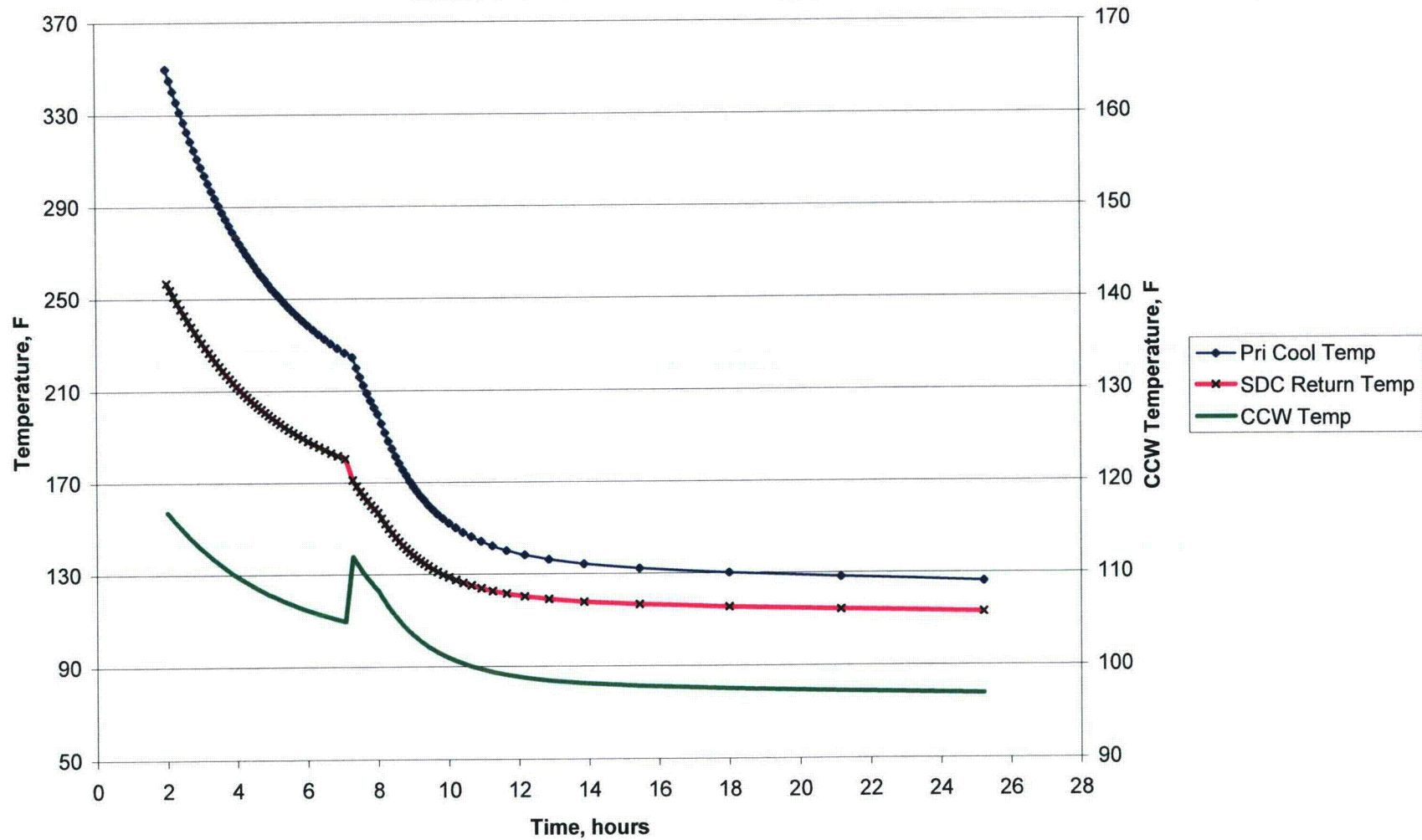






**Shutdown Cooling Temperature Transient with 90F River Water**  
**SDC Hx Fouling = 0.00418 hr-F-sqft/Btu, CCW Hx Fouling = 0.004 hr-F-sqft/Btu**

Second SDC HX Started at 225F Primary Coolant



**Shutdown Cooling Heat Exchanger**

Heat transfer rate, clean	487	Btu/hr-F-sqft
Heat transfer rate, dirty	320	Btu/hr-F-sqft
Heat Transfer Area (ft2)	5020	
Number of U-tubes	514	
tube od, inch	0.75	
tube gage (BWG, inch)	18	0.049
tube id, inch	0.652	
Tube flow area, ft^2	1.19175	(from tube number and id)
Shell Flow Area, ft^2	2.5904	(adjusted to give bet fit to data sheet velocities)
Shell film correction factor	0.09751	

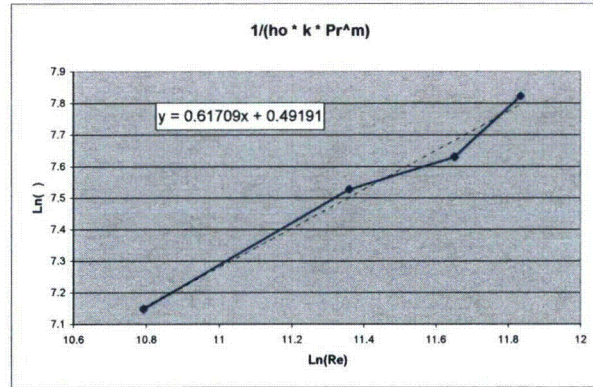
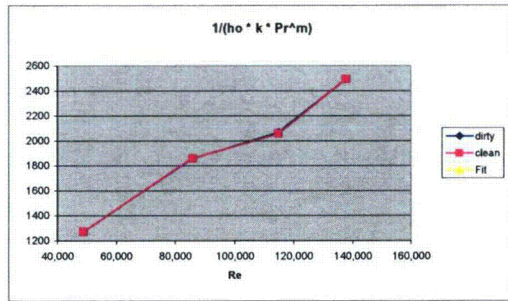
**Hx Design Point (Mode B)**

	Q, gpm	W	Pt,i	Tt,i	Tt,o	Tt,ave	rho lb/ft^3	Cp Btu/lb-F	mu lb/ft-sec	k Btu/hr-ft-F	Vel	Re	Pr	h (Btu/hr-ft-F)	Fouling, hr-ft^2/Btu	Udirty	Uclean	WCp	Cr	NTU	effectiveness	DT	to	Duty mmBtu/hr	
tube	3000	1,476,852	3.88918	140	114.93	127.47	61.38	0.9989	3.50E-04	0.372	5.609	53,484	3.3809	1554	0.0005			1,475,215	0.66	1.089	0.53330358	25.07	114.93	36.98	
metal						114.38			3.95E-04	8.775				2005		320.002	487.85								
shell	4500	2,237,087	100	93	109.57	101.28	61.98	0.9977	4.52E-04	0.362	3.870	114,657	4.4774	1233	0.0005			2,231,873	1.5129	1.089	#N/A	16.57	109.57	37.1	
																0.000810743	0.000814			0.0010716					
												-1.53E-08	-3.6E-06			2,066.65	2,057.66								
<b>Mode A</b>																									
tube	1500	741,518	2.9424	125	100.16	112.58	61.63	0.9983	4.02E-04	0.367	2.804	23,342	3.9442	839	0			740,278	0.66	1.067	0.52842214	24.84	100.16	18.39	
metal						99.40			4.61E-04	8.697				1988		157.280	313.22								
shell	2250	1,121,755	95	78	94.43	86.21	62.16	0.9976	5.35E-04	0.356	1.935	48,566	5.3992	759	0.00316542			1,119,112	1.5117	1.067	#N/A	16.43	94.43	18.526	
																0.001261508	0.001262			0.003165					
												5.7E-05	5.7E-05			1,271.19	1,271.19								
<b>Mode C</b>																									
tube	2250	1,079,449	15.896	212	158.65	185.33	59.81	1.0033	2.24E-04	0.387	4.206	61,051	2.0890	1483	0			1,083,007	0.75	0.815	0.45595948	53.35	158.65	57.78	
metal						150.11			2.89E-04	9.001				2057		175.878	440.88								
shell	2937	1,455,601	95	95	134.77	114.88	61.79	0.9980	3.93E-04	0.368	2.526	85,650	3.8445	994	0.00341756			1,452,745	1.3414	0.815	#N/A	39.77	134.77	58.931	
																0.000935297	0.000935			0.003418					
												7.1E-05	7.1E-05			1,857.22	1,858.06								
<b>Mode D</b>																									
tube	3400	1,599,745	33.5275	255	198.02	226.51	58.66	1.0093	1.75E-04	0.393	6.356	116,024	1.6139	2270	0			1,614,677	0.69	0.526	0.35611814	56.98	198.02	92.00	
metal						170.59			2.48E-04	9.124				2085		169.130	575.70								
shell	4728	2,343,356	95	95	134.34	114.67	61.79	0.9980	3.94E-04	0.368	4.067	137,599	3.8534	1332	0.0041756			2,338,741	1.4484	0.526	#N/A	39.34	134.34	94.391	
																0.000696222	0.000696			0.004176					
												5.4E-05	5.4E-05			2,493.60	2,493.52								

tube od, inch 0.75  
 tube gage (BWG, inch) 18 0.049  
 tube id, inch 0.652

Re	Re		Ln(clean)
	dirty	clean	
48,566	1,271	1,271	10.79068
85,650	1,857	1,858	11.35803
114,657	2,067	2,058	11.6497
137,599	2,494	2,494	11.8321

Ln(Re) Ln(clean)  
 0.61709 0.49192  
 1.63545328  
 0.333



Effectiveness-Capacity Ratio-NTU for mix flow Hx

NTU	Capacity Ratio - WcP(tube) < WcP(shell)						
	0	0.2	0.4	0.6	0.8	1	0
0.5	0.393	0.378	0.364	0.350	0.337	0.324	0
1	0.632	0.593	0.557	0.523	0.492	0.462	0
1.5	0.777	0.718	0.664	0.613	0.567	0.524	0
2	0.865	0.792	0.723	0.661	0.603	0.552	0
2.5	0.918	0.835	0.757	0.685	0.620	0.562	0
3	0.950	0.861	0.775	0.697	0.626	0.564	0
3.5	0.970	0.876	0.785	0.701	0.627	0.561	0
4	0.982	0.884	0.789	0.702	0.624	0.556	0
4.5	0.989	0.889	0.791	0.700	0.620	0.551	0
5	0.993	0.892	0.790	0.697	0.615	0.544	0
5.5	0.996	0.893	0.789	0.693	0.609	0.538	0
6	0.998	0.893	0.787	0.689	0.604	0.532	0
6.5	0.999	0.893	0.785	0.685	0.599	0.526	0
7	0.999	0.892	0.782	0.680	0.593	0.520	0
7.5	0.999	0.892	0.780	0.676	0.588	0.515	0
8	1.000	0.891	0.777	0.672	0.583	0.510	0
8.5	1.000	0.890	0.774	0.668	0.578	0.505	0
9	1.000	0.889	0.771	0.664	0.573	0.500	0
9.5	1.000	0.888	0.769	0.660	0.569	0.496	0
10	1.000	0.887	0.766	0.656	0.564	0.492	0

Capacity Ratio - WcP(shell) < WcP(tube)						
0	0.2	0.4	0.6	0.8	1	0
0.5	0.393	0.378	0.364	0.350	0.337	0.324
1	0.632	0.593	0.557	0.523	0.492	0.462
1.5	0.777	0.718	0.664	0.613	0.567	0.524
2	0.865	0.791	0.723	0.661	0.603	0.552
2.5	0.918	0.833	0.757	0.685	0.620	0.562
3	0.950	0.857	0.775	0.697	0.626	0.564
3.5	0.970	0.870	0.785	0.701	0.627	0.561
4	0.982	0.876	0.789	0.702	0.624	0.556
4.5	0.989	0.878	0.791	0.700	0.620	0.551

18/8 Cr/Ni Steel (e.g. A249 TP304)

°F	Thermal Conductivity, Btu/hr/sqR/°F
70	8.6
100	8.7
150	9
200	9.3
250	9.6
300	9.8
350	10.1
400	10.4
450	10.6
500	10.9
550	11.1
600	11.3
650	11.6
700	11.8
750	12
800	12.2
850	12.5
900	12.7
950	12.9
1000	13.2
1050	13.4
1100	13.6
1150	13.8
1200	14
1250	14.3
1300	14.5
1350	14.7
1400	14.9
1450	15.1
1500	15.3

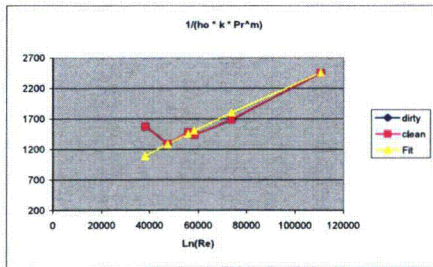
**Component Cooling Water Heat Exchanger**

Heat Transfer Area (ft2) 12400 effective  
 Number of tubes 2280  
 No. of Passes 3  
 tube od 0.75  
 tube gage (BWG) 18 0.049  
 tube id 0.652  
 Tube flow area, ft\*2 1.76212  
 Shell Flow Area, ft\*2 1.74197  
 Shell film correction factor 1.02130

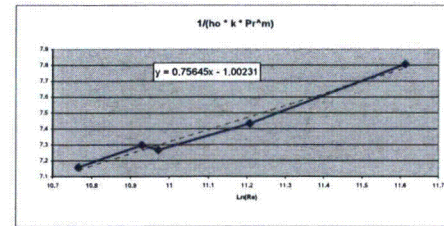
Tubes: 3/4", 18 BWG w. min wall, ST/STL - SA-249-TP-304 (OPPD Drawing File No. 18674,  
 Whitlock Mfg Co. N o. L-26132-1  
 Flow arrangement, pure counterflow per draining Cramer and Lindell drawing FC-AC1B1, dated 7/26/99

tube 0.333333  
 shell 0.333333

	Q, gpm	W	Pt,i	Tt,i	Tt,o	Tt,ave	rho lb/ft*3	Cp Btu/lb-F	mu lb/ft-sec	k Btu/hr-ft-F	Vel	Re	Pr	h (Btu/hr-ft2-F)	Fouling, hr-ft2-F/Btu	Udirty	Uclean	WCp	Cr	NTU	effectiveness	DT	to	Duty mmBtu/hr	
<b>Hx Design Point (Mode E)</b>																									
tube	2673	1,332,918	100	85	185.12	135.06	62.17	0.9989	3.27E-04	0.375	3.380	34,892	3.1407	1000	0			1,331,462	1.20	2,721		-100.12	185.12	-133.30	
metal						157.46				9.045				2067		244.003	408.45								
shell	2283	1,109,178	100	239.8	119.91	179.85	60.57	1.0024	2.32E-04	0.386	2.920	110,479	2.1712	1228	0.00165			1,111,834	0.8350	2,721	0.775	-119.89	119.91	134.00	
														-5.1E-08	-2.7E-06	0.0008146	0.0008172		0.00165						
																2,454.50	2,446.64								
<b>Mode A</b>																									
tube	1575	785,390	100	85	99.96	92.48	62.17	0.9976	4.97E-04	0.359	1.991	13,526	4.9820	523	0			783,494	1.02	2,820		-14.96	99.96	-11.72	
metal						95.18				8.678				1983		174.966	237.22								
shell	1550	771,090	75	105.5	90.27	97.88	62.02	0.9977	4.68E-04	0.361	1.982	38,103	4.6634	661	0.0015			769,338	0.9819	2,820	0.743	-15.23	90.27	12.00	
																190.1	266		0.00150						
																0.001057	0.001056								
																1,569.46	1,570.93								
<b>Mode B</b>																									
tube	3270	1,634,163	100	70	99.75	84.87	62.31	0.9976	5.43E-04	0.355	4.135	25,765	5.4952	896	0			1,630,306	1.14	2,056		-29.75	99.75	-48.50	
metal						93.16				8.670				1981		237.195	368.20								
shell	2885	1,434,171	95	118.4	84.50	101.45	61.98	0.9977	4.51E-04	0.362	3.690	73,637	4.4688	1078	0.0015			1,430,862	0.8777	2,056	0.700	-33.90	84.50	48.18	
																233.6	359.6		0.00150						
																0.0009926	0.0009927								
																1,687.93	1,687.85								
<b>Mode C</b>																									
tube	2518	1,258,356	100	70	86.01	78.01	62.31	0.9978	5.91E-04	0.352	3.184	18,239	6.0346	695	0			1,255,608	1.15	2,312		-16.01	86.01	-20.11	
metal						82.01				8.629				1972		204.055	294.06								
shell	2200	1,096,865	95	95.2	76.82	86.01	62.16	0.9976	5.36E-04	0.356	2.814	47,375	5.4135	808	0.0015			1,094,283	0.8715	2,312	0.729	-18.38	76.82	18.92	
																203.7	293.3		0.00150						
																0.0012467	0.001247								
																1,284.79	1,284.48								
<b>Mode D</b>																									
tube	2518	1,255,626	100	85	101.28	93.14	62.17	0.9976	4.94E-04	0.359	3.184	21,786	4.9410	764	0			1,252,598	1.15	2,443		-16.28	101.28	-20.40	
metal						97.00				8.686				1985		215.009	317.36								
shell	2200	1,093,785	95	110.2	91.51	100.85	61.99	0.9977	4.54E-04	0.362	2.814	55,804	4.5003	875	0.0015			1,091,251	0.8712	2,443	0.742	-18.69	91.51	18.92	
																215.5	318.4		0.00150						
																0.0011318	0.0011321								
																1,477.97	1,477.53								
<b>Mode F</b>																									
tube	3333	1,662,034	100	85	109.93	97.47	62.17	0.9976	4.71E-04	0.361	4.214	30,250	4.6857	982	0			1,658,073	1.65	2,867		-24.93	109.93	-41.34	
metal						105.42				8.727				1994		231.626	354.95								
shell	2025	1,003,970	95	134	92.74	113.37	61.81	0.9980	3.99E-04	0.367	2.590	58,209	3.9076	874	0.0015			1,001,950	0.6043	2,867	0.842	-41.26	92.74	39.488	
																228.3	347.2		0.00150						
																0.001207	0.001207								
																1,432.97	1,432.99								



Re	dirty	clean		
38,103	1,569.46	1,570.93		
47,375	1,284.79	1,284.48	10.7658	7.158348
55,804	1,477.97	1,477.53	10.9296	7.298424
58,209	1,432.97	1,432.99	10.9718	7.267505
73,637	1,687.93	1,687.85	11.2069	7.431255
110,479	2,454.50	2,446.64	11.6126	7.80568
			0.75645	-0.99266
				0.37059

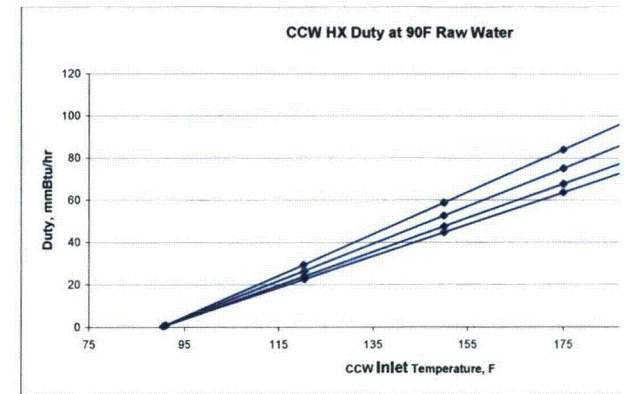


### CCW Heat Exchanger Performance at Various Fouling Coefficients and CCW Inlet Temperatures with 90F River Water

River Water Temp 90  
 No CCW Hx 3  
 RW Flow, Total, gpm 7159  
 CCW Flow, total, gpm 8100  
 Shell Film Multiplier 1.0213  
 Shell Film Re power 0.75645  
 Shell Film Pr power 0.33333333  
 Fouling (total = tube side) 0.004

CCW - Based on Average Raw Water Flow

Case	Tube (River)				Shell (CCW)				Tube	Shell	Fouling (Total = Tube Side)	CCW HX tube side								CCW HX shell side						
	Q, gpm	Pi	Tt,i	Tt,o	Q, gpm	Pi	Ts,i	Ts,o	h (Btu/hr-ft <sup>2</sup> -F)	h (Btu/hr-ft <sup>2</sup> -F)		kmetal	Udiry	W	WCp	Cr	NTU	effectiveness	DT	Tt,o	W	WCp	Cr	NTU	effectiveness	DTs
1A	2386.3	30	90	90.40	2700	90	90.50	90.15	719	966	8.658	0.0000	318.35	1,188,935	1,186,437	0.88	3.327	0.802	0.40	90.40	1,345,134	1,341,950	1.1311	3.327	0.729	0.35
1B	2386.3	30	90	114.64	2700	90	120.25	98.39	772	1066	8.729	0.0000	341.38	1,188,935	1,186,529	0.89	3.568	0.814	24.64	114.64	1,339,892	1,337,062	1.1269	3.568	0.742	21.86
1C	2386.3	30	90	139.48	2700	90	150.00	105.91	826	1159	8.816	0.0000	363.46	1,188,935	1,186,901	0.89	3.797	0.825	49.48	139.48	1,333,683	1,331,798	1.1221	3.797	0.752	44.09
1D	2386.3	30	90	160.71	2700	90	175.00	111.74	872	1233	8.897	0.0000	381.30	1,188,935	1,187,386	0.89	3.982	0.832	70.71	160.71	1,327,839	1,327,076	1.1176	3.982	0.761	63.26
1E	2386.3	30	90	182.19	2700	90	200.00	117.17	917	1302	8.982	0.0000	398.50	1,188,935	1,188,014	0.90	4.159	0.838	92.19	182.19	1,321,501	1,322,146	1.1129	4.159	0.768	82.83
2A	2386.3	30	90	90.72	2700	90	91.00	90.36	719	968	8.659	0.0015	215.63	1,188,935	1,186,436	0.88	2.254	0.720	0.72	90.72	1,345,046	1,341,861	1.1310	2.254	0.661	0.64
2B	2386.3	30	90	112.25	2700	90	120.50	100.75	767	1073	8.729	0.0015	225.55	1,188,935	1,186,507	0.89	2.357	0.730	22.25	112.25	1,339,490	1,336,709	1.1266	2.357	0.671	19.75
2C	2386.3	30	90	134.24	2700	90	150.00	110.55	815	1170	8.815	0.0015	234.61	1,188,935	1,186,804	0.89	2.451	0.737	44.24	134.24	1,332,841	1,331,107	1.1216	2.451	0.679	39.45
2D	2386.3	30	90	153.15	2700	90	175.00	118.46	856	1248	8.896	0.0015	241.70	1,188,935	1,187,198	0.90	2.524	0.743	63.15	153.15	1,326,485	1,326,007	1.1169	2.524	0.686	56.54
2E	2386.3	30	90	172.24	2700	90	200.00	126.04	896	1322	8.981	0.0015	248.30	1,188,935	1,187,707	0.90	2.592	0.748	82.24	172.24	1,319,552	1,320,670	1.1119	2.592	0.692	73.96
3A	2386.3	30	90	90.65	2700	90	91.00	90.42	719	968	8.659	0.0030	162.93	1,188,935	1,186,436	0.88	1.703	0.653	0.65	90.65	1,345,039	1,341,853	1.1310	1.703	0.604	0.58
3B	2386.3	30	90	110.15	2700	90	120.50	102.61	762	1077	8.729	0.0030	168.39	1,188,935	1,186,489	0.89	1.760	0.661	20.15	110.15	1,339,199	1,336,456	1.1264	1.760	0.612	17.89
3C	2386.3	30	90	130.00	2700	90	150.00	114.33	806	1180	8.814	0.0030	173.25	1,188,935	1,186,732	0.89	1.810	0.667	40.00	130.00	1,332,148	1,330,540	1.1212	1.810	0.619	35.67
3D	2386.3	30	90	147.03	2700	90	175.00	123.91	843	1261	8.895	0.0030	176.98	1,188,935	1,187,058	0.90	1.849	0.671	57.03	147.03	1,325,368	1,325,131	1.1163	1.849	0.625	51.09
3E	2386.3	30	90	164.20	2700	90	200.00	133.22	879	1337	8.979	0.0030	180.40	1,188,935	1,187,479	0.90	1.884	0.675	74.20	164.20	1,317,945	1,319,465	1.1111	1.884	0.630	66.78
4A	2386.3	30	90	90.61	2700	90	91.00	90.46	719	968	8.659	0.0040	140.10	1,188,935	1,186,436	0.88	1.464	0.615	0.61	90.61	1,345,035	1,341,849	1.1310	1.464	0.571	0.54
4B	2386.3	30	90	108.95	2700	90	120.50	103.68	760	1080	8.729	0.0040	144.06	1,188,935	1,186,480	0.89	1.506	0.621	18.95	108.95	1,339,033	1,336,311	1.1263	1.506	0.578	16.82
4C	2386.3	30	90	127.59	2700	90	150.00	116.47	800	1185	8.814	0.0040	147.54	1,188,935	1,186,694	0.89	1.542	0.626	37.59	127.59	1,331,750	1,330,216	1.1209	1.542	0.584	33.53
4D	2386.3	30	90	143.57	2700	90	175.00	127.00	835	1268	8.894	0.0040	150.19	1,188,935	1,186,984	0.90	1.569	0.630	53.57	143.57	1,324,728	1,324,632	1.1160	1.569	0.589	48.00
4E	2386.3	30	90	162.90	2700	90	205.00	139.30	876	1361	8.995	0.0040	153.06	1,188,935	1,187,444	0.90	1.598	0.634	72.90	162.90	1,315,408	1,317,591	1.1096	1.598	0.595	65.70



RW Flow, Total, gpm 7159  
 CCW Flow, total, gpm 8100

Case	Ts,o	Duty, per Hx	Tshell,in	Tshell,out	TD
1A	90.15	0.48	90.50	90.15	0.15
1B	98.39	29.23	120.25	98.39	8.39
1C	105.91	58.72	150.00	105.91	15.91
1D	111.74	83.95	175.00	111.74	21.74
1E	117.17	109.52	200.00	117.17	27.17
2A	90.36	0.85	91.00	90.36	0.36
2B	100.75	26.40	120.50	100.75	10.75
2C	110.55	52.51	150.00	110.55	20.55
2D	118.46	74.97	175.00	118.46	28.46
2E	126.04	97.67	200.00	126.04	36.04
3A	90.42	0.77	91.00	90.42	0.42
3B	102.61	23.90	120.50	102.61	12.61
3C	114.33	47.47	150.00	114.33	24.33
3D	123.91	67.70	175.00	123.91	33.91
3E	133.22	88.11	200.00	133.22	43.22
4A	90.46	0.73	91.00	90.46	0.46
4B	103.68	22.48	120.50	103.68	13.68
4C	116.47	44.61	150.00	116.47	26.47
4D	127.00	63.58	175.00	127.00	37.00
4E	139.30	86.56	205.00	139.30	49.30

CCW HX Ts,o

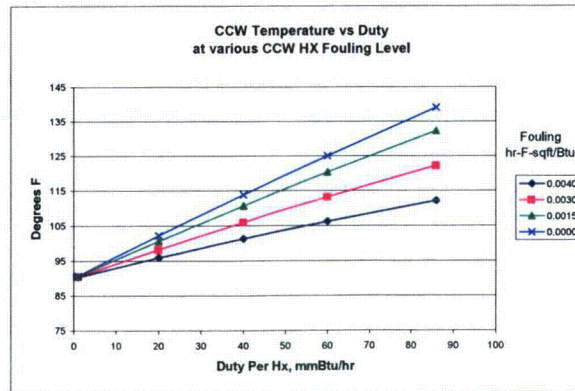
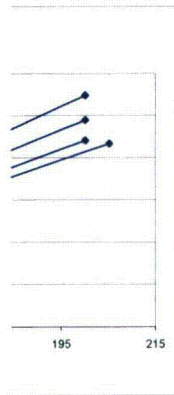
fouling	Duty, mmBtu/hr	1	20	40	60	86
0.0000	91.05	110.79	131.19	151.27	177.01	
0.0015	91.17	113.17	135.93	158.37	187.18	
0.0030	91.29	115.56	140.70	165.52	197.42	
0.0040	91.37	117.16	143.89	170.30	204.27	

CCW HX shell outlet temperature

fouling	Duty, mmBtu/hr	1	20	40	60	86
0.0000	90.30	95.85	101.23	106.21	112.19	
0.0015	90.42	98.22	105.95	113.24	122.19	
0.0030	90.55	100.61	110.69	120.31	132.27	
0.0040	90.63	102.20	113.85	125.04	139.01	

Average CCW

90.68	103.32	116.21	128.74	144.60
90.80	105.70	120.94	135.81	154.69
90.92	108.09	125.69	142.92	164.85
91.00	109.68	128.87	147.67	171.64





Shutdown Cooling Temperature Transient with 90F River Water											SDC							
Hx Fouling = 0.001 hr-F-sqft/Btu, CCW Hx Fouling = 0.0015 hr-F-sqft/Btu																		
Initial RC Temperature, F											350	SDC HX		CCWHX				
Initial Time											2	2754	Shell Film Multiplier		0.09751			
RCS Temperature after 8 hours											156.99	Shell Film Re power		0.61709				
Time after trip to 130F Primary Coolant Temp											21.99	Initial CCW to SDC Hx		1850				
Time after SDC initiation to 130F PC Temp											20.0	Shell Film Pr power		0.333				
Decay heat equilibrium at 90F river temp											20.48	CCW Flow Step Temp		275				
											Fouling (total = tube side)		0.001	0.0015				
													0.00418	0.004				
											SDCHx							
											Tube				Shell			
Time	Step	Q(D)	P(pp)	P(lp)	P(sdc)	Total Q	dTrc											
hrs	hrs	mmBtu/hr				degF/hr	Q, gpm	Pi	Tl,i	Tl,o	Q, gpm	Pi	Ts,i	Ts,o				
2.00	0.1	54.966	18	1.5	-136.99	-62.52	-56.84	3000	315	350.00	250.33	1850	95	106.95	261.21			
2.10	0.10	54.107	18	1.5	-134.00	-60.40	-54.91	3000	315	344.32	247.03	1850	95	106.59	257.44			
2.20	0.10	53.300	18	1.5	-131.12	-58.32	-53.02	3000	315	338.83	243.83	1850	95	106.23	253.81			
2.30	0.10	52.540	18	1.5	-128.33	-56.29	-51.17	3000	315	333.52	240.74	1850	95	107.89	250.29			
2.40	0.10	51.822	18	1.5	-125.63	-54.31	-49.37	3000	315	328.41	237.75	1850	95	107.56	246.90			
2.50	0.10	51.143	18	1.5	-123.02	-52.38	-47.62	3000	315	323.47	234.85	1850	95	107.24	243.62			
2.60	0.10	50.500	18	1.5	-120.51	-50.51	-45.92	3000	315	318.71	232.06	1850	95	106.92	240.46			
2.70	0.10	49.888	18	1.5	-118.08	-48.69	-44.26	3000	315	314.12	229.36	1850	95	106.62	237.41			
2.80	0.10	49.305	18	1.5	-115.73	-46.93	-42.66	3000	315	309.69	226.75	1850	95	106.33	234.47			
2.90	0.10	48.749	18	1.5	-113.47	-45.23	-41.11	3000	315	305.42	224.23	1850	95	106.05	231.64			
3.00	0.10	48.218	18	1.5	-111.29	-43.58	-39.61	3000	315	301.31	221.79	1850	95	105.78	228.90			
3.10	0.10	47.710	18	1.5	-109.19	-41.98	-38.17	3000	315	297.35	219.45	1850	95	105.51	226.27			
3.20	0.10	47.223	18	1.5	-107.17	-40.44	-36.77	3000	315	293.53	217.18	1850	95	105.26	223.73			
3.30	0.10	46.756	18	1.5	-105.21	-38.96	-35.41	3000	315	289.86	215.00	1850	95	105.01	221.29			
3.40	0.14	46.307	18	1.5	-103.33	-37.52	-34.11	3000	315	286.32	212.89	1850	95	104.78	218.93			
3.54	0.14	45.724	18	1.5	-100.86	-35.64	-32.40	3000	315	281.88	210.12	1850	95	104.46	215.85			
3.68	0.15	45.150	18	1.5	-98.43	-33.78	-30.71	3000	315	277.10	207.39	1850	95	104.16	212.81			
3.82	0.15	44.583	18	1.5	-131.08	-67.00	-60.91	3000	315	272.60	179.88	4246	95	108.23	170.99			
3.98	0.16	44.017	18	1.5	-124.23	-60.71	-55.20	3000	315	263.20	175.45	4246	95	107.39	166.83			
4.14	0.10	43.450	18	1.5	-117.67	-54.72	-49.75	3000	315	254.21	171.37	4246	95	106.57	162.85			
4.24	0.10	43.116	18	1.5	-114.04	-51.43	-46.75	3000	315	249.24	169.10	4246	95	106.12	160.64			
4.34	0.10	42.793	18	1.5	-110.63	-48.33	-43.94	3000	315	244.56	166.96	4246	95	105.69	158.56			
4.44	0.11	42.478	18	1.5	-107.40	-45.42	-41.29	3000	315	240.15	164.93	4246	95	105.29	156.60			
4.55	0.11	42.152	18	1.5	-104.17	-42.52	-38.66	3000	315	235.73	162.89	4246	95	104.88	154.64			
4.66	0.12	41.817	18	1.5	-100.96	-39.64	-36.04	3000	315	231.33	160.84	4246	95	104.48	152.69			
4.78	0.13	41.472	18	1.5	-97.77	-36.80	-33.45	3000	315	226.97	158.81	4246	95	104.07	150.75			
4.91	0.14	41.116	18	1.5	-94.61	-33.99	-30.90	3000	315	222.64	156.79	4246	95	103.67	148.83			
5.05	0.15	40.748	18	1.5	-91.48	-31.23	-28.39	3000	315	218.36	154.78	4246	95	103.27	146.92			
5.20	0.16	40.366	18	1.5	-88.38	-28.51	-25.92	3000	315	214.11	152.78	4246	95	102.88	145.04			
5.36	0.18	39.968	18	1.5	-85.31	-25.84	-23.50	3000	315	209.92	150.79	4246	95	102.48	143.17			
5.54	0.19	39.553	18	1.5	-82.29	-23.24	-21.13	3000	315	205.78	148.83	4246	95	102.10	141.34			
5.73	0.20	39.118	18	1.5	-79.32	-20.70	-18.82	3000	315	201.71	146.89	4246	95	101.71	139.52			
5.93	0.20	38.687	0	1.5	-76.57	-18.38	-16.55	3000	315	197.94	145.09	4246	95	101.36	137.85			
6.13	0.20	38.275	0	1.5	-73.97	-16.17	-14.37	3000	315	194.33	143.41	4246	95	101.03	136.31			
6.33	0.15	37.880	0	1.5	-71.51	-14.13	-12.32	3000	315	191.33	141.91	4246	95	100.73	134.91			
6.48	0.17	37.592	0	1.5	-69.17	-12.24	-10.40	3000	315	188.51	139.10	4246	95	100.18	132.33			
6.65	0.20	37.276	0	1.5	-67.51	-10.51	-8.61	3000	315	186.85	137.22	4246	95	99.81	130.62			
6.85	0.20	36.929	0	1.5	-65.81	-9.04	-7.04	3000	315	185.51	135.27	4246	95	99.43	128.84			
7.05	0.24	36.587	0	1.5	-64.12	-7.64	-5.64	3000	315	184.55	133.26	4246	95	99.04	127.03			
7.29	0.27	36.195	0	1.5	-62.48	-6.33	-4.41	3000	315	183.89	131.44	4246	95	98.68	125.39			
7.56	0.30	35.772	0	1.5	-60.89	-5.11	-3.32	3000	315	183.53	129.51	4246	95	98.31	123.66			
7.86	0.35	35.318	0	1.5	-59.35	-4.04	-2.40	3000	315	183.25	127.62	4246	95	97.94	121.97			
8.22	0.42	34.821	0	1.5	-57.86	-3.11	-1.61	3000	315	183.03	125.79	4246	95	97.59	120.35			
8.63	0.50	34.271	0	1.5	-56.41	-2.31	-0.91	3000	315	182.89	124.03	4246	95	97.24	118.78			
9.13	0.61	33.655	0	1.5	-55.04	-1.61	-0.49	3000	315	182.79	122.33	4246	95	96.92	117.29			
9.74	0.78	32.956	0	1.5	-53.74	-1.01	-0.27	3000	315	182.72	120.72	4246	95	96.61	115.88			
10.52	1.02	32.150	0	1.5	-52.51	-0.51	-0.14	3000	315	182.68	119.21	4246	95	96.32	114.56			
11.54	1.40	31.202	0	1.5	-51.34	-0.24	-0.08	3000	315	182.65	117.81	4246	95	96.05	113.34			
12.94	2.00	30.069	0	1.5	-50.21	-0.10	-0.04	3000	315	182.63	116.52	4246	95	95.80	112.22			
14.94	2.00	28.705	0	1.5	-49.11	-0.07	-0.02	3000	315	182.61	115.32	4246	95	95.57	111.18			
16.94	2.00	27.563	0	1.5	-48.04	-0.05	-0.01	3000	315	182.60	114.12	4246	95	95.34	110.15			
18.94	2.00	26.587	0	1.5	-47.01	-0.04	-0.01	3000	315	182.59	113.22	4246	95	95.17	109.38			



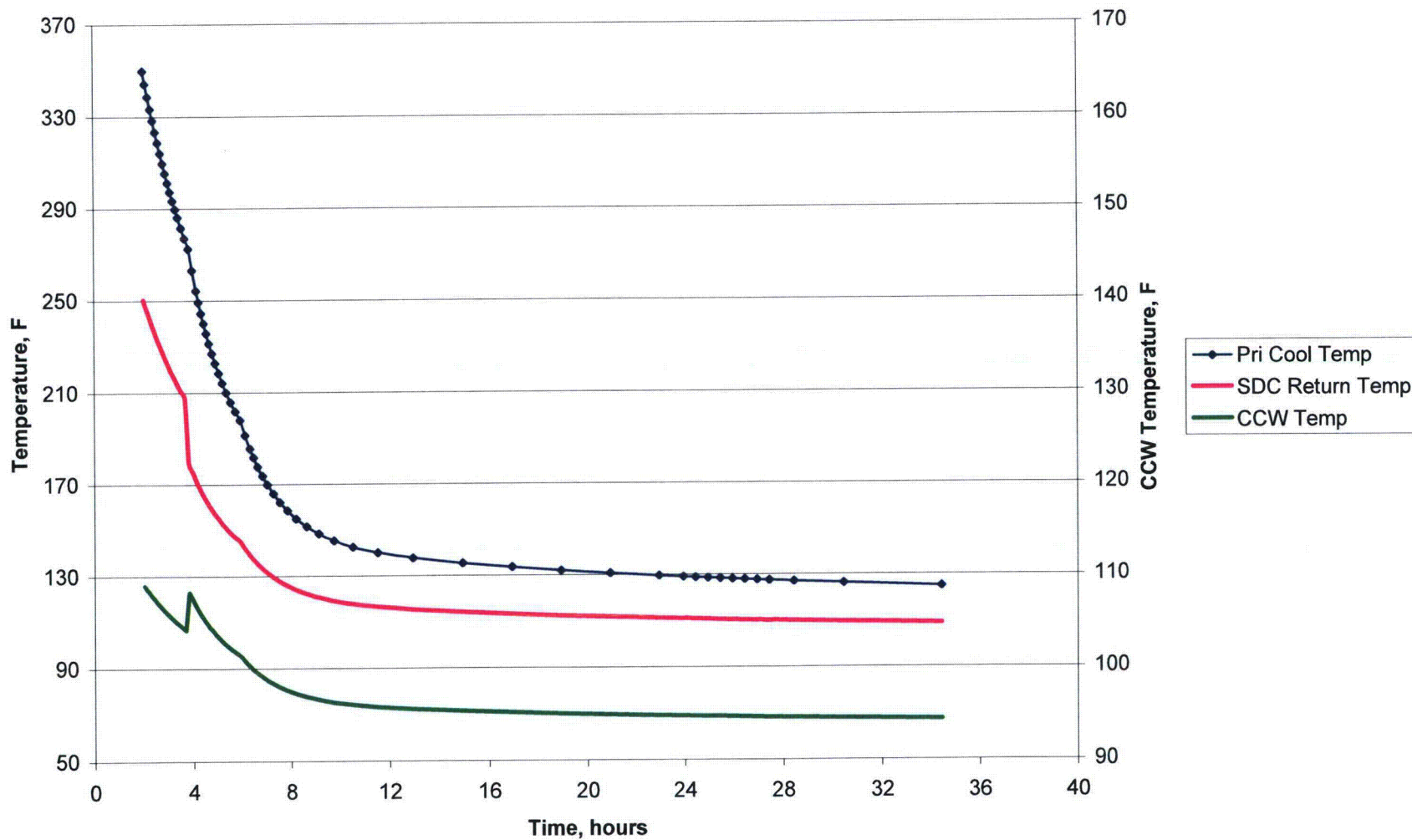


									SDCHx							
Time	Step	Q(D)	P(pp)	P(lp)	P(sdc)	Total Q	dTrc	Tube				Shell				
hrs	hrs	mmBtu/hr				degF/hr	Q, gpm	Pi	Ttj	Tt,o	Q, gpm	Pi	Ts,j	Ts,o		
20.94	2.00	25.739	0	1.5	-27.87	-0.63	-0.58	3000	315	130.63	111.76	4246	95	94.89	108.13	
22.94	1.00	24.991	0	1.5	-27.05	-0.56	-0.51	3000	315	129.47	111.17	4246	95	94.78	107.63	
23.94	0.50	24.649	0	1.5	-26.69	-0.54	-0.49	3000	315	128.97	110.90	4246	95	94.73	107.40	
24.44	0.50	24.485	0	1.5	-26.51	-0.53	-0.48	3000	315	128.72	110.78	4246	95	94.71	107.30	
24.94	0.50	24.325	0	1.5	-26.34	-0.52	-0.47	3000	315	128.48	110.66	4246	95	94.68	107.19	
25.44	0.50	24.170	0	1.5	-26.17	-0.50	-0.46	3000	315	128.25	110.54	4246	95	94.66	107.09	
25.94	0.50	24.018	0	1.5	-26.01	-0.49	-0.45	3000	315	128.02	110.42	4246	95	94.64	106.99	
26.44	0.50	23.871	0	1.5	-25.85	-0.48	-0.44	3000	315	127.79	110.30	4246	95	94.62	106.89	
26.94	0.50	23.727	0	1.5	-25.70	-0.47	-0.43	3000	315	127.58	110.19	4246	95	94.60	106.80	
27.44	1.00	23.586	0	1.5	-25.54	-0.46	-0.42	3000	315	127.36	110.08	4246	95	94.58	106.70	
28.44	2.00	23.315	0	1.5	-25.25	-0.43	-0.39	3000	315	126.95	109.87	4246	95	94.53	106.52	
30.44	4.00	22.809	0	1.5	-24.69	-0.38	-0.34	3000	315	126.16	109.46	4246	95	94.46	106.16	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	
34.44	0.00	21.917	0	1.5	-23.71	-0.29	-0.26	3000	315	124.78	108.75	4246	95	94.32	105.58	

Time hrs	Tube										Shell								kmetal	Udirty
	Tt,ave	rho	Cp	mu	k	Vel	Re	Pr	h (Btu/hr-ft <sup>2</sup> -F)	Tt,ave	rho	Cp	mu	k	Vel	Re	Pr	h (Btu/hr-ft <sup>2</sup> -F)		
20.94	121.19	61.54	0.9974	3.71E-04	0.370	5.609	50,598	3.5929	1516	101.51	61.98	0.9977	4.51E-04	0.362	3.652	108,441	4.4658	1191	8.758	322.81
22.94	120.32	61.56	0.9974	3.74E-04	0.370	5.609	50,204	3.6251	1511	101.20	61.98	0.9977	4.52E-04	0.362	3.652	108,095	4.4819	1190	8.755	322.41
23.94	119.94	61.57	0.9974	3.75E-04	0.370	5.609	50,030	3.6395	1509	101.07	61.98	0.9977	4.53E-04	0.362	3.652	107,942	4.4891	1189	8.753	322.24
24.44	119.75	61.57	0.9974	3.76E-04	0.370	5.609	49,946	3.6465	1508	101.00	61.98	0.9977	4.53E-04	0.362	3.652	107,888	4.4925	1189	8.753	322.15
24.94	119.57	61.58	0.9974	3.76E-04	0.370	5.609	49,864	3.6534	1506	100.94	61.98	0.9977	4.53E-04	0.362	3.652	107,796	4.4959	1189	8.752	322.07
25.44	119.39	61.58	0.9974	3.77E-04	0.370	5.609	49,784	3.6601	1505	100.88	61.99	0.9977	4.54E-04	0.362	3.652	107,726	4.4992	1188	8.751	321.99
25.94	119.22	61.58	0.9973	3.78E-04	0.370	5.609	49,705	3.6667	1504	100.81	61.99	0.9977	4.54E-04	0.362	3.652	107,657	4.5025	1188	8.751	321.91
26.44	119.05	61.59	0.9973	3.78E-04	0.370	5.609	49,629	3.6731	1503	100.75	61.99	0.9977	4.54E-04	0.362	3.652	107,590	4.5056	1188	8.750	321.83
26.94	118.88	61.59	0.9973	3.79E-04	0.370	5.609	49,554	3.6795	1502	100.70	61.99	0.9977	4.54E-04	0.362	3.652	107,524	4.5087	1187	8.750	321.75
27.44	118.72	61.59	0.9973	3.79E-04	0.370	5.609	49,482	3.6856	1501	100.64	61.99	0.9977	4.55E-04	0.362	3.652	107,460	4.5118	1187	8.749	321.68
28.44	118.41	61.60	0.9973	3.80E-04	0.369	5.609	49,340	3.6978	1499	100.53	61.99	0.9977	4.55E-04	0.362	3.652	107,336	4.5177	1187	8.748	321.53
30.44	117.81	61.61	0.9973	3.83E-04	0.369	5.609	49,072	3.7208	1496	100.32	61.99	0.9977	4.56E-04	0.362	3.652	107,100	4.5289	1186	8.746	321.26
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77
34.44	116.77	61.64	0.9972	3.86E-04	0.369	5.609	48,603	3.7618	1489	99.95	62.00	0.9977	4.58E-04	0.362	3.652	106,688	4.5486	1184	8.742	320.77

Time	SDC HX tube side								SDC HX shell side							SDC Duty Btu/hr	TLo Iterate	Ts,o Iterate	Qccw, other mmBtu/hr	CCW Duty mmBtu/hr	Total CCW Flow gpm	# CCW Hx	CCW Duty per HX mmBtu/hr	CCW Temp Ts,o
	hrs	W	WCp	Cr	NTU	ffectiveness	DT	Tl,o	W	WCp	Cr	NTU	ffectiveness	DTs	Ts,o									
20.94	1,480,793	1,476,983	0.701	1.097	0.528	18.87	111.76	2,110,716	2,105,847	#N/A	#N/A	#N/A	13.24	108.13	27.87	111.76	108.13	7.358	35.23	8,100	3	11.74	94.89	
22.94	1,481,259	1,477,394	0.702	1.096	0.528	18.31	111.17	2,110,852	2,105,972	#N/A	#N/A	#N/A	12.84	107.63	27.05	111.17	107.63	7.358	34.41	8,100	3	11.47	94.78	
23.94	1,481,464	1,477,574	0.702	1.095	0.528	18.06	110.90	2,110,912	2,106,027	#N/A	#N/A	#N/A	12.67	107.40	26.69	110.90	107.40	7.358	34.05	8,100	3	11.35	94.73	
24.44	1,481,562	1,477,661	0.702	1.094	0.528	17.94	110.78	2,110,941	2,106,054	#N/A	#N/A	#N/A	12.59	107.30	26.51	110.78	107.30	7.358	33.87	8,100	3	11.29	94.71	
25.44	1,481,659	1,477,746	0.702	1.094	0.527	17.83	110.66	2,110,969	2,106,080	#N/A	#N/A	#N/A	12.51	107.19	26.34	110.66	107.19	7.358	33.70	8,100	3	11.23	94.68	
25.44	1,481,753	1,477,829	0.702	1.094	0.527	17.71	110.54	2,110,996	2,106,105	#N/A	#N/A	#N/A	12.43	107.09	26.17	110.54	107.09	7.358	33.53	8,100	3	11.18	94.66	
25.94	1,481,844	1,477,910	0.702	1.093	0.527	17.60	110.42	2,111,023	2,106,130	#N/A	#N/A	#N/A	12.35	106.99	26.01	110.42	106.99	7.358	33.37	8,100	3	11.12	94.64	
26.44	1,481,934	1,477,989	0.702	1.093	0.527	17.49	110.30	2,111,050	2,106,154	#N/A	#N/A	#N/A	12.27	106.89	25.85	110.30	106.89	7.358	33.21	8,100	3	11.07	94.62	
26.94	1,482,021	1,478,065	0.702	1.093	0.527	17.38	110.19	2,111,075	2,106,178	#N/A	#N/A	#N/A	12.20	106.80	25.70	110.19	106.80	7.358	33.05	8,100	3	11.02	94.60	
27.44	1,482,105	1,478,140	0.702	1.092	0.527	17.28	110.08	2,111,100	2,106,201	#N/A	#N/A	#N/A	12.13	106.70	25.54	110.08	106.70	7.358	32.90	8,100	3	10.97	94.58	
28.44	1,482,270	1,478,286	0.702	1.092	0.527	17.08	109.87	2,111,149	2,106,246	#N/A	#N/A	#N/A	11.99	106.52	25.25	109.87	106.52	7.358	32.61	8,100	3	10.87	94.53	
30.44	1,482,581	1,478,560	0.702	1.091	0.527	16.70	109.46	2,111,240	2,106,331	#N/A	#N/A	#N/A	11.72	106.18	24.69	109.46	106.18	7.358	32.05	8,100	3	10.68	94.46	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	
34.44	1,483,120	1,479,038	0.702	1.089	0.526	16.03	108.75	2,111,401	2,106,479	#N/A	#N/A	#N/A	11.25	105.58	23.71	108.75	105.58	7.358	31.07	8,100	3	10.36	94.32	

**Shutdown Cooling Temperature Transient with 90F River Water**  
**SDC Hx Fouling = 0.001 hr-F-sqft/Btu, CCW Hx Fouling = 0.0015 hr-F-sqft/Btu**



Shutdown Cooling Temperature Transient with 90F River Water										SDC					
Hx Fouling = 0. hr-F-sqft/Btu, CCW Hx Fouling = 0. hr-F-sqft/Btu															
Initial RC Temperature, F		350								SDC HX		CCW HX			
Initial Time		2				2754		Shell Film Multiplier		0.08751					
RCS Temperature after 8 hours		142.78						Shell Film Re power		0.61709					
Time after trip to 130F Primary Coolant Temp		13.75		Initial CCW to SDChx		1850		Shell Film Pr power		0.333					
Time after SDC initiation to 130F PC Temp		11.7		CCW Flow Step Temp		275		Fouling (total = tube side)		0		0			
Decary heat equilibrium at 90F river temp		12.28								0.00418		0.004			
SDChx															
Time	Step	Q(D)	P(pp)	P(p)	PsdC	Total Q	dTrc	Tube				Shell			
hrs	hrs	mmBtu/hr				degF/hr	Q, gpm	Pi	Tt,i	Tt,o	Q, gpm	Pi	Ts,i	Ts,o	
2.00	0.1	54.966	18	1.5	-148.37	-73.91	-67.19	3000	315	350.00	241.89	1850	95	104.24	269.22
2.10	0.10	54.107	18	1.5	-144.63	-71.02	-64.56	3000	315	343.28	238.18	1850	95	103.93	264.64
2.20	0.10	53.300	18	1.5	-141.02	-68.22	-62.02	3000	315	336.82	234.61	1850	95	103.63	260.24
2.30	0.10	52.540	18	1.5	-137.54	-65.50	-59.55	3000	315	330.62	231.17	1850	95	103.34	256.00
2.40	0.10	51.822	18	1.5	-134.20	-62.87	-57.16	3000	315	324.67	227.85	1850	95	103.06	251.92
2.50	0.10	51.143	18	1.5	-130.98	-60.34	-54.85	3000	315	318.95	224.66	1850	95	102.79	248.00
2.60	0.10	50.500	18	1.5	-127.88	-57.89	-52.62	3000	315	313.47	221.60	1850	95	102.53	244.23
2.70	0.05	49.888	18	1.5	-124.91	-55.52	-50.48	3000	315	308.21	218.65	1850	95	102.28	240.62
2.75	0.10	49.593	18	1.5	-123.48	-54.39	-49.45	3000	315	305.68	217.23	1850	95	102.16	238.88
2.85	0.10	49.024	18	1.5	-120.68	-52.16	-47.42	3000	315	300.74	214.46	1850	95	101.92	235.48
2.95	0.10	48.481	18	1.5	-117.99	-50.01	-45.46	3000	315	296.00	211.79	1850	95	101.69	232.21
3.05	0.11	47.956	18	1.5	-115.38	-47.92	-43.57	3000	315	291.40	209.19	1850	95	101.47	229.07
3.16	0.11	47.432	18	1.5	-112.76	-45.83	-41.66	3000	315	286.80	206.60	1850	95	101.24	225.87
3.27	0.11	46.910	18	1.5	-110.15	-43.74	-39.77	3000	315	282.22	204.00	1850	95	101.02	222.71
3.38	0.12	46.390	18	1.5	-107.55	-41.66	-37.87	3000	315	277.66	201.41	1850	95	100.79	219.56
3.50	0.13	45.870	18	1.5	-105.04	-39.61	-36.00	3000	315	273.11	198.83	1850	95	100.56	216.43
3.63	0.13	45.350	18	1.5	-103.38	-38.53	-34.17	3000	315	268.58	196.26	1850	95	100.33	213.32
3.76	0.10	44.829	18	1.5	-101.55	-37.52	-32.37	3000	315	264.06	193.70	1850	95	100.10	210.24
3.86	0.10	44.451	18	1.5	-100.17	-36.22	-30.20	3000	315	260.54	191.14	1850	95	100.72	207.19
3.96	0.10	44.085	18	1.5	-125.15	-61.56	-55.97	3000	315	241.34	153.58	4246	95	102.30	162.11
4.06	0.10	43.731	18	1.5	-120.48	-57.25	-52.04	3000	315	235.75	151.43	4246	95	101.90	159.46
4.16	0.10	43.389	18	1.5	-116.13	-53.24	-48.40	3000	315	230.54	149.43	4246	95	101.53	157.00
4.26	0.10	43.057	18	1.5	-112.09	-49.53	-45.03	3000	315	225.70	147.55	4246	95	101.18	154.70
4.36	0.10	42.735	18	1.5	-108.32	-46.08	-41.89	3000	315	221.20	145.80	4246	95	100.86	152.56
4.46	0.11	42.413	18	1.5	-104.70	-42.78	-38.89	3000	315	216.87	144.10	4246	95	100.54	150.50
4.57	0.12	42.078	18	1.5	-101.08	-39.50	-35.91	3000	315	212.55	142.40	4246	95	100.23	148.45
4.69	0.13	41.729	18	1.5	-97.49	-36.26	-32.96	3000	315	208.27	140.71	4246	95	99.91	146.41
4.82	0.14	41.366	18	1.5	-93.93	-33.07	-30.06	3000	315	204.03	139.03	4246	95	99.60	144.39
4.96	0.15	40.987	0	1.5	-90.42	-29.94	-27.18	3000	315	199.84	137.36	4246	95	99.29	142.40
5.11	0.17	40.590	0	1.5	-84.88	-22.79	-19.30	3000	315	193.23	134.71	4246	95	98.79	139.24
5.28	0.11	40.173	0	1.5	-79.46	-17.78	-13.35	3000	315	186.76	132.10	4246	95	98.31	136.16
5.39	0.13	39.895	0	1.5	-76.15	-16.76	-12.60	3000	315	182.82	130.49	4246	95	98.01	134.28
5.52	0.15	39.592	0	1.5	-72.75	-15.65	-11.78	3000	315	178.76	128.84	4246	95	97.70	132.34
5.67	0.16	39.261	0	1.5	-69.24	-14.48	-10.89	3000	315	174.57	127.12	4246	95	97.38	130.34
5.83	0.17	38.913	0	1.5	-65.81	-13.29	-9.93	3000	315	170.48	125.43	4246	95	97.06	128.38
6.00	0.19	38.545	0	1.5	-62.45	-12.04	-8.90	3000	315	166.46	123.77	4246	95	96.76	126.47
6.19	0.20	38.153	0	1.5	-59.16	-10.71	-7.73	3000	315	162.53	122.13	4246	95	96.45	124.59
6.39	0.20	37.763	0	1.5	-56.19	-9.33	-6.43	3000	315	158.98	120.65	4246	95	96.18	122.90
6.59	0.20	37.389	0	1.5	-53.62	-7.91	-5.00	3000	315	155.91	119.35	4246	95	95.94	121.44
6.79	0.20	37.030	0	1.5	-51.39	-6.45	-3.45	3000	315	153.23	118.23	4246	95	95.73	120.16
6.99	0.20	36.684	0	1.5	-49.44	-5.00	-1.83	3000	315	150.89	117.24	4246	95	95.55	119.05
7.19	0.20	36.352	0	1.5	-47.73	-3.68	-0.16	3000	315	148.84	116.37	4246	95	95.39	118.08
7.39	0.20	36.031	0	1.5	-46.24	-2.40	0.00	3000	315	147.05	115.61	4246	95	95.24	117.22
7.59	0.20	35.722	0	1.5	-44.92	-1.25	0.00	3000	315	145.46	114.93	4246	95	95.12	116.47
7.79	0.20	35.423	0	1.5	-43.75	-0.21	0.00	3000	315	144.06	114.34	4246	95	95.01	115.80
7.99	0.20	35.134	0	1.5	-42.72	-0.21	0.00	3000	315	142.82	113.81	4246	95	94.91	115.21
8.19	0.20	34.855	0	1.5	-41.80	-0.21	0.00	3000	315	141.72	113.33	4246	95	94.83	114.69
8.39	0.20	34.584	0	1.5	-40.98	-0.21	0.00	3000	315	140.73	112.91	4246	95	94.75	114.22
8.59	0.20	34.322	0	1.5	-40.24	-0.21	0.00	3000	315	139.84	112.53	4246	95	94.68	113.80
8.79	0.20	34.068	0	1.5	-39.57	-0.21	0.00	3000	315	139.03	112.18	4246	95	94.61	113.41
8.99	0.20	33.821	0	1.5	-38.97	-0.21	0.00	3000	315	138.31	111.87	4246	95	94.56	113.07
9.19	0.20	33.582	0	1.5	-38.42	-0.21	0.00	3000	315	137.64	111.59	4246	95	94.50	112.75





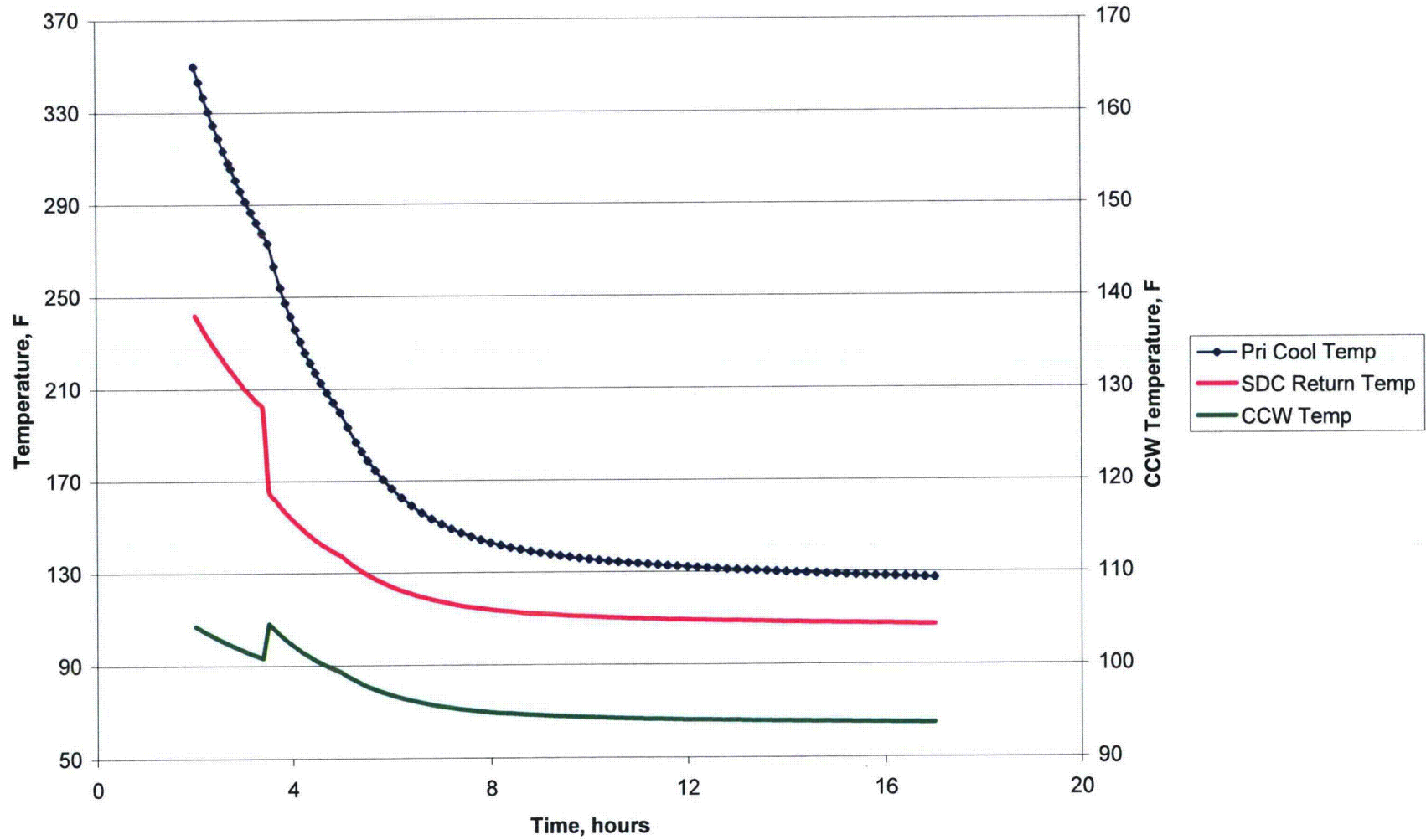


		SDCHx													
Time	Step	Q(D)	P(pp)	P(lp)	P(sdc)	Total Q	dTrc	Tube				Shell			
hrs	hrs	mmBtu/hr					degF/hr	Q, gpm	Pi	Ttj	Tto	Q, gpm	Pi	Tsj	Tso
9.39	0.20	33.349	0	1.5	-37.91	-3.06	-2.79	3000	315	137.04	111.32	4246	95	94.46	112.47
9.59	0.20	33.123	0	1.5	-37.45	-2.83	-2.57	3000	315	136.48	111.08	4246	95	94.41	112.20
9.79	0.20	32.903	0	1.5	-37.02	-2.62	-2.38	3000	315	135.97	110.86	4246	95	94.37	111.96
9.99	0.20	32.688	0	1.5	-36.63	-2.44	-2.22	3000	315	135.49	110.66	4246	95	94.33	111.73
10.19	0.20	32.480	0	1.5	-36.26	-2.28	-2.07	3000	315	135.04	110.47	4246	95	94.30	111.52
10.39	0.20	32.276	0	1.5	-35.92	-2.14	-1.95	3000	315	134.63	110.29	4246	95	94.27	111.33
10.59	0.20	32.078	0	1.5	-35.59	-2.02	-1.83	3000	315	134.24	110.12	4246	95	94.23	111.14
10.79	0.20	31.885	0	1.5	-35.29	-1.91	-1.73	3000	315	133.87	109.96	4246	95	94.21	110.97
10.99	0.20	31.696	0	1.5	-35.00	-1.81	-1.64	3000	315	133.53	109.81	4246	95	94.18	110.80
11.19	0.20	31.512	0	1.5	-34.73	-1.72	-1.56	3000	315	133.20	109.67	4246	95	94.15	110.65
11.39	0.20	31.333	0	1.5	-34.47	-1.64	-1.49	3000	315	132.89	109.53	4246	95	94.13	110.50
11.59	0.20	31.157	0	1.5	-34.23	-1.57	-1.43	3000	315	132.59	109.40	4246	95	94.10	110.36
11.79	0.20	30.985	0	1.5	-33.99	-1.50	-1.37	3000	315	132.30	109.28	4246	95	94.08	110.22
11.99	0.20	30.817	0	1.5	-33.76	-1.45	-1.31	3000	315	132.03	109.16	4246	95	94.06	110.09
12.19	0.20	30.653	0	1.5	-33.55	-1.39	-1.27	3000	315	131.77	109.05	4246	95	94.04	109.97
12.39	0.20	30.492	0	1.5	-33.34	-1.34	-1.22	3000	315	131.51	108.94	4246	95	94.02	109.85
12.59	0.20	30.335	0	1.5	-33.13	-1.30	-1.18	3000	315	131.27	108.83	4246	95	94.00	109.73
12.79	0.20	30.181	0	1.5	-32.94	-1.26	-1.14	3000	315	131.03	108.73	4246	95	93.98	109.62
12.99	0.20	30.030	0	1.5	-32.75	-1.22	-1.11	3000	315	130.81	108.63	4246	95	93.96	109.51
13.19	0.20	29.882	0	1.5	-32.57	-1.18	-1.08	3000	315	130.58	108.53	4246	95	93.94	109.41
13.39	0.20	29.737	0	1.5	-32.39	-1.15	-1.05	3000	315	130.37	108.44	4246	95	93.93	109.31
13.59	0.20	29.595	0	1.5	-32.21	-1.12	-1.02	3000	315	130.16	108.35	4246	95	93.91	109.21
13.79	0.20	29.456	0	1.5	-32.05	-1.09	-0.99	3000	315	129.96	108.26	4246	95	93.89	109.11
13.99	0.20	29.319	0	1.5	-31.88	-1.06	-0.97	3000	315	129.76	108.17	4246	95	93.88	109.02
14.19	0.20	29.185	0	1.5	-31.72	-1.04	-0.94	3000	315	129.56	108.09	4246	95	93.86	108.93
14.39	0.20	29.054	0	1.5	-31.57	-1.01	-0.92	3000	315	129.38	108.01	4246	95	93.85	108.84
14.59	0.20	28.924	0	1.5	-31.41	-0.99	-0.90	3000	315	129.19	107.93	4246	95	93.83	108.75
14.79	0.20	28.797	0	1.5	-31.27	-0.97	-0.88	3000	315	129.01	107.85	4246	95	93.82	108.67
14.99	0.20	28.673	0	1.5	-31.12	-0.95	-0.86	3000	315	128.84	107.77	4246	95	93.81	108.58
15.19	0.20	28.550	0	1.5	-30.98	-0.93	-0.84	3000	315	128.66	107.70	4246	95	93.79	108.50
15.39	0.20	28.430	0	1.5	-30.84	-0.91	-0.83	3000	315	128.50	107.63	4246	95	93.78	108.42
15.59	0.20	28.312	0	1.5	-30.70	-0.89	-0.81	3000	315	128.33	107.55	4246	95	93.77	108.34
15.79	0.20	28.195	0	1.5	-30.57	-0.87	-0.79	3000	315	128.17	107.48	4246	95	93.75	108.27
15.99	0.20	28.081	0	1.5	-30.44	-0.86	-0.78	3000	315	128.01	107.41	4246	95	93.74	108.19
16.19	0.20	27.968	0	1.5	-30.31	-0.84	-0.76	3000	315	127.85	107.35	4246	95	93.73	108.12
16.39	0.20	27.858	0	1.5	-30.18	-0.82	-0.75	3000	315	127.70	107.28	4246	95	93.71	108.05
16.59	0.20	27.749	0	1.5	-30.06	-0.81	-0.74	3000	315	127.55	107.21	4246	95	93.70	107.97
16.79	0.20	27.642	0	1.5	-29.94	-0.79	-0.72	3000	315	127.40	107.15	4246	95	93.69	107.91
16.99	0.20	27.536	0	1.5	-29.82	-0.78	-0.71	3000	315	127.26	107.09	4246	95	93.68	107.84

Time	Tube										Shell										kmetal	Udirty
	hrs	Tt,ave	rho	Cp	mu	k	Vel	Re	Pr	h (Btu/hr-ft <sup>2</sup> -F)	Tt,ave	rho	Cp	mu	k	Vel	Re	Pr	h (Btu/hr-ft <sup>2</sup> -F)			
9.39	124.18	61.43	0.9976	3.61E-04	0.371	5.609	51,921	3.4856	1534	103.46	61.95	0.9977	4.41E-04	0.363	3.652	110,646	4.3654	1199	8.772	480.18		
9.59	123.78	61.44	0.9975	3.62E-04	0.371	5.609	51,740	3.4996	1531	103.31	61.95	0.9977	4.42E-04	0.363	3.652	110,471	4.3732	1199	8.770	479.78		
9.79	123.41	61.45	0.9975	3.63E-04	0.371	5.609	51,573	3.5126	1529	103.16	61.96	0.9977	4.43E-04	0.363	3.652	110,310	4.3804	1198	8.769	479.41		
9.99	123.07	61.46	0.9975	3.64E-04	0.371	5.609	51,418	3.5247	1527	103.03	61.96	0.9977	4.43E-04	0.363	3.652	110,160	4.3871	1198	8.768	479.07		
10.19	122.76	61.46	0.9975	3.65E-04	0.371	5.609	51,274	3.5360	1525	102.91	61.96	0.9977	4.44E-04	0.363	3.652	110,022	4.3934	1197	8.766	478.75		
10.39	122.46	61.47	0.9975	3.66E-04	0.371	5.609	51,140	3.5467	1523	102.80	61.96	0.9977	4.44E-04	0.363	3.652	109,892	4.3993	1197	8.765	478.46		
10.59	122.18	61.48	0.9975	3.67E-04	0.371	5.609	51,014	3.5568	1522	102.69	61.96	0.9977	4.45E-04	0.363	3.652	109,770	4.4048	1196	8.764	478.18		
10.79	121.92	61.48	0.9975	3.68E-04	0.371	5.609	50,895	3.5663	1520	102.59	61.96	0.9977	4.45E-04	0.363	3.652	109,655	4.4100	1196	8.763	477.91		
10.99	121.67	61.49	0.9974	3.69E-04	0.371	5.609	50,783	3.5753	1519	102.49	61.96	0.9977	4.46E-04	0.363	3.652	109,547	4.4149	1195	8.762	477.66		
11.19	121.43	61.50	0.9974	3.70E-04	0.370	5.609	50,676	3.5839	1517	102.40	61.97	0.9977	4.46E-04	0.363	3.652	109,444	4.4196	1195	8.761	477.42		
11.39	121.21	61.50	0.9974	3.71E-04	0.370	5.609	50,575	3.5922	1516	102.31	61.97	0.9977	4.47E-04	0.363	3.652	109,347	4.4240	1194	8.760	477.20		
11.59	121.00	61.51	0.9974	3.71E-04	0.370	5.609	50,479	3.6000	1515	102.23	61.97	0.9977	4.47E-04	0.363	3.652	109,253	4.4283	1194	8.760	476.98		
11.79	120.79	61.51	0.9974	3.72E-04	0.370	5.609	50,386	3.6076	1513	102.15	61.97	0.9977	4.48E-04	0.363	3.652	109,164	4.4324	1194	8.759	476.78		
11.99	120.60	61.52	0.9974	3.73E-04	0.370	5.609	50,298	3.6149	1512	102.08	61.97	0.9977	4.48E-04	0.363	3.652	109,079	4.4363	1193	8.758	476.58		
12.19	120.41	61.52	0.9974	3.73E-04	0.370	5.609	50,213	3.6219	1511	102.00	61.97	0.9977	4.48E-04	0.363	3.652	108,997	4.4400	1193	8.757	476.39		
12.39	120.23	61.52	0.9974	3.74E-04	0.370	5.609	50,131	3.6287	1510	101.93	61.97	0.9977	4.49E-04	0.363	3.652	108,918	4.4437	1193	8.757	476.20		
12.59	120.05	61.53	0.9974	3.75E-04	0.370	5.609	50,052	3.6352	1509	101.87	61.97	0.9977	4.49E-04	0.363	3.652	108,842	4.4472	1193	8.756	476.02		
12.79	119.88	61.53	0.9974	3.75E-04	0.370	5.609	49,976	3.6416	1508	101.80	61.97	0.9977	4.49E-04	0.362	3.652	108,768	4.4506	1192	8.755	475.85		
12.99	119.72	61.54	0.9974	3.76E-04	0.370	5.609	49,902	3.6477	1507	101.74	61.97	0.9977	4.49E-04	0.362	3.652	108,697	4.4539	1192	8.755	475.69		
13.19	119.56	61.54	0.9974	3.76E-04	0.370	5.609	49,831	3.6537	1506	101.68	61.97	0.9977	4.50E-04	0.362	3.652	108,628	4.4571	1192	8.754	475.52		
13.39	119.40	61.54	0.9974	3.77E-04	0.370	5.609	49,761	3.6596	1505	101.62	61.98	0.9977	4.50E-04	0.362	3.652	108,561	4.4602	1191	8.754	475.37		
13.59	119.25	61.55	0.9973	3.77E-04	0.370	5.609	49,694	3.6653	1504	101.56	61.98	0.9977	4.50E-04	0.362	3.652	108,496	4.4632	1191	8.753	475.22		
13.79	119.11	61.55	0.9973	3.78E-04	0.370	5.609	49,628	3.6708	1503	101.50	61.98	0.9977	4.51E-04	0.362	3.652	108,433	4.4661	1191	8.752	475.07		
13.99	118.97	61.55	0.9973	3.78E-04	0.370	5.609	49,564	3.6763	1502	101.45	61.98	0.9977	4.51E-04	0.362	3.652	108,371	4.4690	1191	8.752	474.92		
14.19	118.83	61.56	0.9973	3.79E-04	0.370	5.609	49,502	3.6816	1501	101.40	61.98	0.9977	4.51E-04	0.362	3.652	108,311	4.4718	1190	8.751	474.78		
14.39	118.69	61.56	0.9973	3.79E-04	0.370	5.609	49,441	3.6868	1500	101.34	61.98	0.9977	4.51E-04	0.362	3.652	108,252	4.4745	1190	8.751	474.64		
14.59	118.56	61.56	0.9973	3.80E-04	0.369	5.609	49,382	3.6918	1500	101.29	61.98	0.9977	4.52E-04	0.362	3.652	108,195	4.4772	1190	8.750	474.51		
14.79	118.43	61.57	0.9973	3.80E-04	0.369	5.609	49,324	3.6968	1499	101.24	61.98	0.9977	4.52E-04	0.362	3.652	108,139	4.4798	1190	8.750	474.37		
14.99	118.30	61.57	0.9973	3.81E-04	0.369	5.609	49,267	3.7017	1498	101.19	61.98	0.9977	4.52E-04	0.362	3.652	108,084	4.4824	1190	8.749	474.25		
15.19	118.18	61.57	0.9973	3.81E-04	0.369	5.609	49,212	3.7065	1497	101.15	61.98	0.9977	4.52E-04	0.362	3.652	108,030	4.4849	1189	8.749	474.12		
15.39	118.06	61.58	0.9973	3.82E-04	0.369	5.609	49,157	3.7111	1497	101.10	61.98	0.9977	4.53E-04	0.362	3.652	107,978	4.4874	1189	8.749	474.00		
15.59	117.94	61.58	0.9973	3.82E-04	0.369	5.609	49,104	3.7157	1496	101.05	61.98	0.9977	4.53E-04	0.362	3.652	107,927	4.4898	1189	8.748	473.87		
15.79	117.83	61.58	0.9973	3.83E-04	0.369	5.609	49,052	3.7203	1495	101.01	61.98	0.9977	4.53E-04	0.362	3.652	107,876	4.4921	1189	8.748	473.76		
15.99	117.71	61.58	0.9973	3.83E-04	0.369	5.609	49,001	3.7247	1494	100.97	61.98	0.9977	4.53E-04	0.362	3.652	107,827	4.4945	1189	8.747	473.64		
16.19	117.60	61.59	0.9973	3.83E-04	0.369	5.609	48,951	3.7291	1494	100.92	61.98	0.9977	4.53E-04	0.362	3.652	107,779	4.4967	1188	8.747	473.52		
16.39	117.49	61.59	0.9973	3.84E-04	0.369	5.609	48,902	3.7334	1493	100.88	61.99	0.9977	4.54E-04	0.362	3.652	107,731	4.4990	1188	8.746	473.41		
16.59	117.38	61.59	0.9973	3.84E-04	0.369	5.609	48,853	3.7376	1492	100.84	61.99	0.9977	4.54E-04	0.362	3.652	107,685	4.5012	1188	8.746	473.30		
16.79	117.28	61.59	0.9973	3.85E-04	0.369	5.609	48,806	3.7417	1492	100.80	61.99	0.9977	4.54E-04	0.362	3.652	107,639	4.5033	1188	8.746	473.19		
16.99	117.17	61.60	0.9973	3.85E-04	0.369	5.609	48,760	3.7458	1491	100.76	61.99	0.9977	4.54E-04	0.362	3.652	107,594	4.5054	1188	8.745	473.09		



**Shutdown Cooling Temperature Transient with 90F River Water  
SDC Hx Fouling = 0. hr-F-sqft/Btu, CCW Hx Fouling = 0. hr-F-sqft/Btu**



Shutdown Cooling Temperature Transient with 90F River Water											SDC									
Hx Fouling = 0.00418 hr-F-sqft/Btu, CCW Hx Fouling = 0.0015 hr-F-sqft/Btu																				
Initial RC Temperature, F											390		SDC HX		CCW HX					
Initial Time											2		2754		Shell Film Multiplier		0.09751			
RCS Temperature after 8 hours											222.08				Shell Film Re power		0.61709			
Time after trip to 130F Primary Coolant Temp											66.02		Initial CCW to SDChx		1850		Shell Film Pr power		0.333	
Time after SDC initiation to 130F PC Temp											64.02		CCW Flow Step Temp		275		Fouling (total = tube side)		0.00418 0.0015	
Decay heat equilibrium at 90F river temp											64.37						0.00418 0.004			
											SDChx									
Time	Step	Q(D)	P(pp)	P(p)	P(sdc)	Total Q	dTrc	Tube				Shell								
hrs	hrs	mmBtu/hr					degF/hr	Q, gpm	Pi	Tl,j	Tl,o	Q, gpm	Pi	Ts,j	Ts,o					
2.00	0.1	54.966	18	1.5	-107.42	-32.95	-29.95	3000	315	350.00	272.14	1850	95	105.291	224.05					
2.10	0.10	54.107	18	1.5	-106.17	-32.56	-29.60	3000	315	347.00	270.13	1850	95	105.13	222.48					
2.20	0.10	53.300	18	1.5	-104.93	-32.13	-29.21	3000	315	344.04	268.15	1850	95	104.98	220.93					
2.30	0.10	52.540	18	1.5	-103.71	-31.67	-28.79	3000	315	341.12	266.19	1850	95	104.82	219.41					
2.40	0.10	51.822	18	1.5	-102.51	-31.18	-28.35	3000	315	338.24	264.25	1850	95	104.67	217.90					
2.50	0.10	51.143	18	1.5	-101.32	-30.68	-27.89	3000	315	335.41	262.34	1850	95	104.52	216.42					
2.60	0.10	50.500	18	1.5	-100.15	-30.15	-27.41	3000	315	332.62	260.46	1850	95	104.38	214.96					
2.70	0.10	49.888	18	1.5	-99.01	-29.62	-26.93	3000	315	329.88	258.61	1850	95	104.23	213.53					
2.80	0.10	49.305	18	1.5	-97.88	-29.08	-26.43	3000	315	327.19	256.80	1850	95	104.09	212.12					
2.90	0.10	48.749	18	1.5	-96.78	-28.53	-25.93	3000	315	324.54	255.01	1850	95	103.95	210.74					
3.00	0.10	48.218	18	1.5	-95.69	-27.97	-25.43	3000	315	321.95	253.26	1850	95	103.81	209.39					
3.10	0.10	47.710	18	1.5	-94.63	-27.42	-24.92	3000	315	319.41	251.54	1850	95	103.67	208.06					
3.20	0.10	47.223	18	1.5	-93.58	-26.86	-24.42	3000	315	316.92	249.85	1850	95	103.54	206.76					
3.30	0.10	46.756	18	1.5	-92.56	-26.31	-23.91	3000	315	314.47	248.20	1850	95	103.41	205.48					
3.40	0.10	46.307	18	1.5	-91.56	-25.75	-23.41	3000	315	312.08	246.58	1850	95	103.28	204.23					
3.50	0.21	45.876	18	1.5	-90.58	-25.20	-22.91	3000	315	309.74	244.99	1850	95	103.16	203.01					
3.71	0.21	45.024	18	1.5	-88.57	-24.05	-21.86	3000	315	304.95	241.73	1850	95	102.90	200.51					
3.92	0.22	44.217	18	1.5	-86.62	-22.90	-20.82	3000	315	300.28	238.96	1850	95	102.65	198.07					
4.14	0.23	43.450	18	1.5	-84.71	-21.76	-19.79	3000	315	295.74	235.46	1850	95	102.41	195.70					
4.37	0.24	42.702	18	1.5	-82.82	-20.62	-18.74	3000	315	291.21	232.37	1850	95	102.16	193.34					
4.61	0.25	41.970	18	1.5	-80.93	-19.46	-17.69	3000	315	286.71	229.30	1850	95	101.92	191.00					
4.86	0.27	41.253	18	1.5	-79.06	-18.31	-16.64	3000	315	282.24	226.24	1850	95	101.68	188.67					
5.13	0.28	40.547	18	1.5	-77.20	-17.15	-15.59	3000	315	277.80	223.20	1850	95	101.44	186.35					
5.41	0.30	39.851	18	1.5	-75.36	-16.00	-14.54	3000	315	273.39	220.63	4246	95	103.47	147.85					
5.71	0.32	39.161	18	1.5	-73.54	-14.84	-13.49	3000	315	269.00	218.10	4246	95	102.86	144.96					
6.03	0.16	38.476	18	1.5	-71.74	-13.67	-12.44	3000	315	264.74	215.61	4246	95	102.29	142.24					
6.20	0.19	38.145	18	1.5	-70.96	-12.50	-11.39	3000	315	260.59	213.16	4246	95	102.03	141.04					
6.38	0.21	37.783	18	1.5	-70.20	-11.33	-10.34	3000	315	256.54	210.74	4246	95	101.76	139.75					
6.60	0.23	37.384	18	1.5	-69.45	-10.16	-9.29	3000	315	252.58	208.34	4246	95	101.47	138.39					
6.82	0.25	36.976	18	1.5	-68.71	-9.00	-8.24	3000	315	248.70	205.96	4246	95	101.19	137.05					
7.07	0.27	36.557	18	1.5	-67.98	-7.83	-7.19	3000	315	244.88	203.60	4246	95	100.91	135.73					
7.34	0.29	36.121	18	1.5	-67.26	-6.66	-6.14	3000	315	241.12	201.26	4246	95	100.63	134.43					
7.63	0.32	35.667	18	1.5	-66.55	-5.50	-5.09	3000	315	237.41	198.94	4246	95	100.35	133.14					
7.95	0.36	35.192	18	1.5	-65.85	-4.34	-4.04	3000	315	233.74	196.64	4246	95	100.08	131.88					
8.31	0.40	34.694	18	1.5	-65.16	-3.18	-3.09	3000	315	230.11	194.35	4246	95	99.82	130.64					
8.71	0.46	34.168	18	1.5	-64.48	-2.02	-2.04	3000	315	226.51	192.07	4246	95	99.56	129.43					
9.17	0.52	33.610	18	1.5	-63.81	-0.86	-0.99	3000	315	222.94	189.80	4246	95	99.30	128.25					
9.69	0.61	33.015	18	1.5	-63.15	0.29	0.32	3000	315	219.40	187.54	4246	95	99.05	127.10					
10.30	0.71	32.375	18	1.5	-62.51	1.44	1.47	3000	315	215.89	185.29	4246	95	98.81	125.99					
11.01	0.86	31.681	18	1.5	-61.88	2.59	2.62	3000	315	212.40	183.04	4246	95	98.58	124.93					
11.87	1.05	30.923	0	1.5	-61.26	3.74	3.77	3000	315	208.92	180.79	4246	95	98.36	123.90					
12.92	1.32	30.087	0	1.5	-60.64	4.89	4.92	3000	315	205.45	178.54	4246	95	98.15	122.90					
14.23	0.26	29.159	0	1.5	-60.02	6.04	6.07	3000	315	201.99	176.29	4246	95	97.95	121.92					
14.49	0.46	28.988	0	1.5	-59.40	7.19	7.22	3000	315	198.54	174.04	4246	95	97.75	121.00					
14.96	0.99	28.694	0	1.5	-58.78	8.34	8.37	3000	315	195.09	171.79	4246	95	97.55	120.10					
15.95	1.09	28.103	0	1.5	-58.16	9.49	9.52	3000	315	191.64	169.54	4246	95	97.35	119.20					
17.05	1.30	27.508	0	1.5	-57.54	10.64	10.67	3000	315	188.19	167.29	4246	95	97.15	118.30					
18.34	1.91	26.864	0	1.5	-56.92	11.79	11.82	3000	315	184.74	165.04	4246	95	96.95	117.40					
20.25	2.73	26.017	0	1.5	-56.30	12.94	12.97	3000	315	181.29	162.79	4246	95	96.75	116.50					
22.98	2.83	24.978	0	1.5	-55.68	14.09	14.12	3000	315	177.84	160.54	4246	95	96.55	115.60					
25.81	3.22	24.059	0	1.5	-55.06	15.24	15.27	3000	315	174.39	158.29	4246	95	96.35	114.70					
29.03	3.88	23.162	0	1.5	-54.44	16.39	16.42	3000	315	170.94	156.04	4246	95	96.15	113.80					





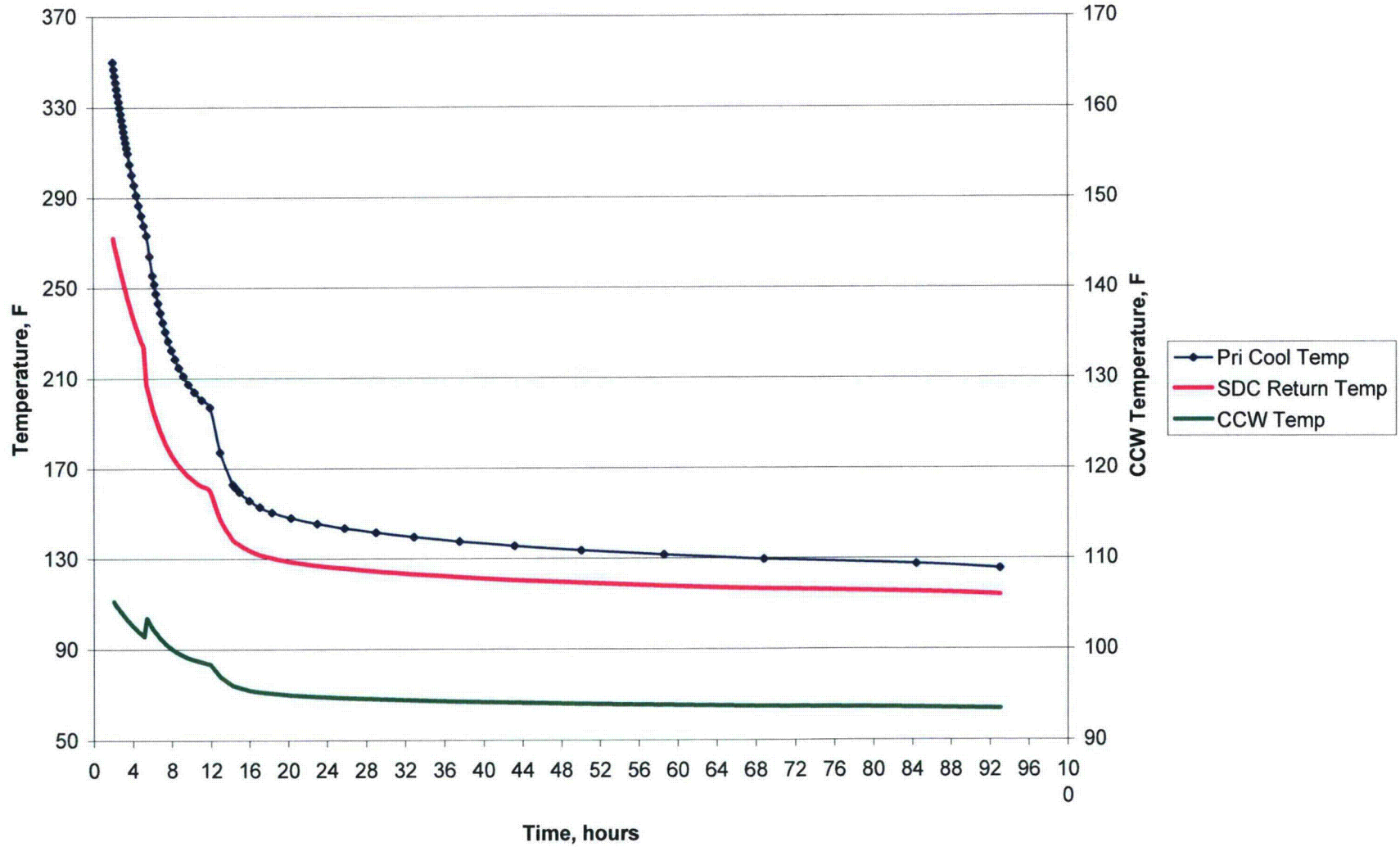


Time		Step	Q(D)	P(pp)	P(lp)	Psdc	Total Q	dTrc	SDCHx							
hrs	hrs								Tube				Shell			
hrs	hrs	mmBtu/hr				degF/hr	Q, gpm	Pi	Tt,i	Tt,o	Q, gpm	Pi	Ts,i	Ts,o		
32.91	4.63	22.242	0	1.5	-24.22	-0.47	-0.43	3000	315	139.53	123.10	4246	95	94.39	105.89	
37.54	5.64	21.315	0	1.5	-23.21	-0.39	-0.35	3000	315	137.53	121.79	4246	95	94.26	105.27	
43.18	6.83	20.373	0	1.5	-22.19	-0.32	-0.29	3000	315	135.53	120.48	4246	95	94.12	104.65	
50.02	8.57	19.428	0	1.5	-21.19	-0.26	-0.23	3000	315	133.53	119.17	4246	95	93.98	104.03	
58.58	10.20	18.461	0	1.5	-20.18	-0.22	-0.20	3000	315	131.53	117.86	4246	95	93.84	103.42	
68.79	15.60	17.528	0	1.5	-19.17	-0.14	-0.13	3000	315	129.53	116.55	4246	95	93.70	102.80	
84.39	8.66	16.408	0	1.5	-18.16	-0.25	-0.23	3000	315	127.53	115.24	4246	95	93.56	102.18	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	
93.05	0.00	15.898	0	1.5	-17.16	0.24	0.22	3000	315	125.53	113.93	4246	95	93.42	101.57	

Time	Tube										Shell										kmetal	Udirty
	hrs	Tt,ave	rho	Cp	mu	k	Vel	Re	Pr	h (Btu/hr-ft <sup>2</sup> -F)	Tt,ave	rho	Cp	mu	k	Vel	Re	Pr	h (Btu/hr-ft <sup>2</sup> -F)			
32.91	131.31	61.38	0.9979	3.38E-04	0.374	5.609	55,307	3.2499	1579	100.14	61.99	0.9977	4.57E-04	0.362	3.652	106,902	4.5384	1185	8.783	159.98		
37.54	129.66	61.42	0.9978	3.43E-04	0.373	5.609	54,539	3.3021	1569	99.76	62.00	0.9977	4.59E-04	0.362	3.652	106,478	4.5588	1183	8.777	159.83		
43.18	128.00	61.46	0.9977	3.48E-04	0.373	5.609	53,772	3.3558	1559	99.38	62.00	0.9977	4.61E-04	0.361	3.652	106,054	4.5794	1182	8.771	159.67		
50.02	126.35	61.49	0.9977	3.53E-04	0.372	5.609	53,008	3.4109	1549	99.01	62.01	0.9977	4.63E-04	0.361	3.652	105,630	4.6001	1180	8.765	159.51		
58.58	124.69	61.52	0.9976	3.59E-04	0.372	5.609	52,247	3.4676	1539	98.63	62.01	0.9977	4.65E-04	0.361	3.652	105,208	4.6209	1178	8.760	159.35		
68.79	123.04	61.56	0.9975	3.64E-04	0.371	5.609	51,488	3.5259	1529	98.25	62.02	0.9976	4.67E-04	0.361	3.652	104,786	4.6419	1177	8.754	159.18		
84.39	121.38	61.59	0.9974	3.70E-04	0.370	5.609	50,731	3.5858	1519	97.87	62.02	0.9976	4.69E-04	0.361	3.652	104,365	4.6631	1175	8.749	159.02		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		
93.05	119.73	61.62	0.9974	3.76E-04	0.370	5.609	49,977	3.6474	1508	97.50	62.03	0.9976	4.70E-04	0.361	3.652	103,945	4.6843	1173	8.743	158.85		

Time	SDC HX tube side							SDC HX shell side							SDC Duty Btu/hr	T <sub>i,o</sub> Iterate	T <sub>s,o</sub> Iterate	Q <sub>ccw, other</sub> mmBtu/hr	CCW Duty mmBtu/hr	Total CCW Flow gpm	# CCW HX	CCW Duty per HX mmBtu/hr	CCW Temp T <sub>s,o</sub>
	hrs	W	WCp	Cr	NTU	Effectiveness	DT	T <sub>i,o</sub>	W	WCp	Cr	NTU	Effectiveness	DTs									
32.91	1,477,058	1,473,968	0.700	0.545	0.364	16.43	123.10	2,111,317	2,106,402	#N/A	#N/A	#N/A	11.50	105.89	24.22	123.10	105.89	7.358	31.57	8,100	3	10.52	94.39
37.54	1,477,917	1,474,699	0.700	0.544	0.364	15.74	121.79	2,111,482	2,106,555	#N/A	#N/A	#N/A	11.02	105.27	23.21	121.79	105.27	7.358	30.56	8,100	3	10.19	94.26
43.18	1,478,764	1,475,423	0.700	0.543	0.363	15.04	120.48	2,111,646	2,106,708	#N/A	#N/A	#N/A	10.54	104.65	22.19	120.48	104.65	7.358	29.55	8,100	3	9.85	94.12
50.02	1,479,601	1,476,139	0.701	0.542	0.363	14.35	119.17	2,111,810	2,106,860	#N/A	#N/A	#N/A	10.06	104.03	21.19	119.17	104.03	7.358	28.54	8,100	3	9.51	93.98
58.58	1,480,426	1,476,848	0.701	0.542	0.363	13.66	117.86	2,111,972	2,107,012	#N/A	#N/A	#N/A	9.58	103.42	20.18	117.86	103.42	7.358	27.53	8,100	3	9.18	93.84
68.79	1,481,239	1,477,548	0.701	0.541	0.362	12.97	116.55	2,112,134	2,107,163	#N/A	#N/A	#N/A	9.10	102.80	19.17	116.55	102.80	7.358	26.53	8,100	3	8.84	93.70
84.39	1,482,040	1,478,240	0.701	0.540	0.362	12.29	115.24	2,112,294	2,107,315	#N/A	#N/A	#N/A	8.62	102.18	18.16	115.24	102.18	7.358	25.52	8,100	3	8.51	93.56
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42
93.05	1,482,830	1,478,924	0.702	0.539	0.361	11.60	113.93	2,112,454	2,107,466	#N/A	#N/A	#N/A	8.14	101.57	17.16	113.93	101.57	7.358	24.51	8,100	3	8.17	93.42

**Shutdown Cooling Temperature Transient with 90F River Water**  
**SDC Hx Fouling = 0.00418 hr-F-sqft/Btu, CCW Hx Fouling = 0.0015 hr-F-sqft/Btu**



Shutdown Cooling Temperature Transient with 90F River Water										SDC Hx					
Fouling = 0.001 hr-F-sqft/Btu, CCW Hx Fouling = 0.004 hr-F-sqft/Btu															
										SDC HX		CCW HX			
Initial RC Temperature, F										350					
Initial Time										2		2754			
RCS Temperature after 8 hours										163.56		Shell Film Multiplier			
Time after trip to 130F Primary Coolant Temp										26.41766		Shell Film Re power			
Time after SDC initiation to 130F PC Temp										24.4		Shell Film Pr power			
Decay heat equilibrium at 90F river temp										24.75		Fouling (total = tube side)			
										Initial CCW to SDC Hx		1850			
										CCW Flow Step Temp		275			
										CCW Flow Step flow		4246			
										SDCHx					
Time	Step	Q(D)	P(pp)	P(lp)	P(sdc)	Total Q	dTrc	Tube				Shell			
hrs	hrs	mmBtu/hr					degF/hr	Q, gpm	Pi	Tt,i	Tt,o	Q, gpm	Pi	Ts,i	Ts,o
2.00	0.1	54,966	18	1.5	-132.18	-57.72	-52.47	3000	315	350.00	253.88	1850	95	117.54	264.89
2.10	0.10	54,107	18	1.5	-129.52	-55.91	-50.83	3000	315	344.75	250.76	1850	95	117.04	261.15
2.20	0.20	53,300	18	1.5	-126.94	-54.14	-49.22	3000	315	339.67	247.73	1850	95	116.56	257.71
2.40	0.20	51,822	18	1.5	-121.93	-50.60	-46.00	3000	315	329.83	241.84	1850	95	115.61	251.06
2.60	0.20	50,500	18	1.5	-117.23	-47.23	-42.94	3000	315	320.63	236.31	1850	95	114.72	244.83
2.80	0.20	49,305	18	1.5	-112.84	-44.03	-40.03	3000	315	312.04	231.13	1850	95	113.89	239.02
3.00	0.20	48,218	18	1.5	-108.74	-41.02	-37.29	3000	315	304.03	226.29	1850	95	113.11	233.60
3.20	0.20	47,223	18	1.5	-104.91	-38.19	-34.72	3000	315	296.57	221.77	1850	95	112.38	228.54
3.40	0.20	46,307	18	1.5	-101.35	-35.54	-32.31	3000	315	289.63	217.55	1850	95	111.70	223.83
3.60	0.10	45,460	18	1.5	-98.03	-33.07	-30.06	3000	315	283.17	213.60	1850	95	111.06	219.45
3.70	0.10	45,059	18	1.5	-96.48	-31.92	-29.02	3000	315	280.16	211.77	1850	95	110.76	217.41
3.80	0.10	44,673	18	1.5	-94.99	-30.82	-28.01	3000	315	277.26	209.99	1850	95	110.48	215.45
3.90	0.10	44,300	18	1.5	-126.28	-62.48	-56.80	3000	315	274.46	184.91	4246	95	116.43	176.99
4.00	0.10	43,939	18	1.5	-122.32	-58.88	-53.53	3000	315	268.78	182.22	4246	95	115.69	174.32
4.10	0.20	43,590	18	1.5	-118.59	-55.50	-50.45	3000	315	263.43	179.68	4246	95	114.98	171.81
4.30	0.20	42,924	18	1.5	-111.55	-49.12	-44.66	3000	315	253.33	174.85	4246	95	113.64	167.06
4.50	0.20	42,298	18	1.5	-105.31	-43.51	-39.56	3000	315	244.40	170.55	4246	95	112.45	162.85
4.70	0.20	41,708	18	1.5	-99.78	-38.57	-35.07	3000	315	236.49	166.71	4246	95	111.40	159.12
4.90	0.20	41,150	18	1.5	-94.88	-34.23	-31.12	3000	315	229.48	163.29	4246	95	110.46	155.81
5.10	0.20	40,622	18	1.5	-90.53	-30.41	-27.65	3000	315	223.25	160.24	4246	95	109.62	152.88
5.30	0.20	40,120	18	1.5	-86.67	-27.05	-24.59	3000	315	217.73	157.51	4246	95	108.87	150.27
5.50	0.20	39,643	18	1.5	-83.23	-24.09	-21.90	3000	315	212.81	155.08	4246	95	108.21	147.95
5.70	0.20	39,188	18	1.5	-80.18	-21.49	-19.53	3000	315	208.43	152.90	4246	95	107.61	145.88
5.90	0.20	38,754	18	1.5	-77.45	-19.20	-17.45	3000	315	204.52	150.95	4246	95	107.08	144.04
6.10	0.20	38,339	18	1.5	-75.01	-17.18	-15.61	3000	315	201.03	149.20	4246	95	106.61	142.40
6.30	0.20	37,941	0	1.5	-72.84	-33.39	-30.36	3000	315	197.91	147.64	4246	95	106.18	140.93
6.50	0.20	37,560	0	1.5	-68.60	-29.54	-26.86	3000	315	191.84	144.58	4246	95	105.35	138.06
6.70	0.20	37,194	0	1.5	-64.86	-26.17	-23.79	3000	315	186.46	141.86	4246	95	104.62	135.54
6.90	0.20	36,843	0	1.5	-61.55	-23.21	-21.10	3000	315	181.71	139.44	4246	95	103.97	133.30
7.10	0.20	36,504	0	1.5	-58.62	-20.61	-18.74	3000	315	177.49	137.29	4246	95	103.39	131.31
7.30	0.20	36,178	0	1.5	-56.01	-18.34	-16.67	3000	315	173.74	135.37	4246	95	102.87	129.55
7.50	0.20	35,863	0	1.5	-53.70	-16.34	-14.85	3000	315	170.40	133.65	4246	95	102.41	127.99
7.70	0.20	35,560	0	1.5	-51.64	-14.58	-13.26	3000	315	167.43	132.12	4246	95	102.01	126.59
7.90	0.20	35,266	0	1.5	-49.81	-13.04	-11.85	3000	315	164.78	130.75	4246	95	101.64	125.35
8.10	0.20	34,983	0	1.5	-48.16	-11.68	-10.62	3000	315	162.41	129.53	4246	95	101.31	124.24
8.30	0.20	34,708	0	1.5	-46.70	-10.49	-9.53	3000	315	160.29	128.43	4246	95	101.02	123.24
8.50	0.21	34,442	0	1.5	-45.38	-9.44	-8.58	3000	315	158.38	127.43	4246	95	100.76	122.35
8.71	0.24	34,169	0	1.5	-44.12	-8.45	-7.68	3000	315	156.56	126.49	4246	95	100.51	121.50
8.95	0.27	33,875	0	1.5	-42.87	-7.49	-6.81	3000	315	154.74	125.54	4246	95	100.26	120.65
9.22	0.30	33,555	0	1.5	-41.61	-6.56	-5.96	3000	315	152.93	124.59	4246	95	100.01	119.80
9.52	0.35	33,203	0	1.5	-40.36	-5.66	-5.14	3000	315	151.11	123.64	4246	95	99.75	118.95
9.87	0.42	32,815	0	1.5	-39.11	-4.79	-4.36	3000	315	149.29	122.69	4246	95	99.50	118.10
10.29	0.50	32,379	0	1.5	-37.86	-3.98	-3.62	3000	315	147.47	121.73	4246	95	99.25	117.25
10.79	0.50	31,896	0	1.5	-36.61	-3.23	-2.93	3000	315	145.66	120.78	4246	95	99.00	116.41
11.29	0.50	31,423	0	1.5	-35.60	-2.68	-2.44	3000	315	144.20	120.01	4246	95	98.80	115.73
11.79	0.50	30,986	0	1.5	-34.77	-2.28	-2.07	3000	315	142.98	119.37	4246	95	98.63	115.16
12.29	0.50	30,573	0	1.5	-34.06	-1.98	-1.80	3000	315	141.94	118.82	4246	95	98.49	114.68
12.79	0.50	30,182	0	1.5	-33.44	-1.76	-1.60	3000	315	141.04	118.34	4246	95	98.36	114.26
13.29	0.50	29,810	0	1.5	-32.89	-1.58	-1.44	3000	315	140.24	117.92	4246	95	98.25	113.88
13.79	0.50	29,457	0	1.5	-32.40	-1.44	-1.31	3000	315	139.52	117.54	4246	95	98.15	113.55
14.29	0.50	29,120	0	1.5	-31.95	-1.33	-1.21	3000	315	138.87	117.19	4246	95	98.06	113.25
14.79	0.50	28,798	0	1.5	-31.54	-1.24	-1.12	3000	315	138.27	116.87	4246	95	97.98	112.97



