Appendix 5.3.3-6

Calculation of Overall Heat Transfer Coefficient(U) and Fouling Factor(f) in Run 5-2

OPERATION CONDITION
FOR
RUN 5-2

1. Operation Period	24th Oct. to 7th Nov.
2. Operation Time	230 h
3. Scale Control Method	Hybrid
4. Operation Mode	Recirculation
5. Ball Cleaning	at F.F in B.H of 0.34-0.36m^2K/kW
6. Top Brine Temperature	112℃
7. Flow Rate	
-Make Up Seawater	2.45 m^3/h
-Recirculation	6.5 m^3/h
-Product Water	0.79 m^3/h
-Blow Brine	1.66 m^3/h
8. Chenical Consituents of Brine	
-pH at 25℃	8.12
-M-Alkalinity as $CaCO_3$	55 - 60 mg/L
-Chloride ion	32,720 mg/L
-Concentration factor as Cl^-	1.39
9. Dosing Rate of Chemicals	
-Scale Inhibior = PPN(M)	1 mg/L
-Acid = 98% H_2SO_4	72 mg/L

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 25, 94** **Time: 00:00** **Total Operation Time: 8.0 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	15500	15500
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	89.5	76.8	63.3	50.1	37.5	31.9	27
Outlet Temp. (deg. C)	112	89.5	76.8	63.3	50.1	37	31.9
Temp. Rise (deg. C)	22.5	12.7	13.5	13.2	12.6	5.1	4.9
Flashing Temp. (deg. C)	116	92.4	82.3	69.8	56.7	41.6	35.7
Heat Transfer Rate (kJ/S)	160.932	90.351	95.690	93.240	88.729	87.122	83.645
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.899	7.548	10.890	11.905	11.800	6.836	5.916
U (kW/sq.m/K)	2.895	6.180	4.536	4.044	3.882	2.572	2.853
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0891	0.0103	0.0244	0.0512	0.0615	0.1927	0.1544

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 25, 94** **Time: 04:00** **Total Operation Time: 12.0 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	15500	15500
Specific Heat (kJ/kg/K)	3.961	3.940	3.925	3.911	3.899	3.967	3.964
Inlet Temp. (deg. C)	89	76.1	62.3	49	36.2	30.8	27
Outlet Temp. (deg. C)	112	89	76.1	62.3	49	35	30.8
Temp. Rise (deg. C)	23	12.9	13.8	13.3	12.8	4.2	3.8
Flashing Temp. (deg. C)	119.5	91.6	81.3	69.1	55.7	39.8	34.5
Heat Transfer Rate (kJ/S)	164.495	91.758	97.794	93.922	90.113	71.731	64.863
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	16.396	7.226	10.650	12.272	11.982	6.681	5.378
U (kW/sq.m/K)	2.147	6.556	4.741	3.951	3.883	2.166	2.434
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2093	0.0010	0.0149	0.0570	0.0615	0.2655	0.2148

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 25, 94** **Time: 8:00** **Total Operation Time: 16 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.940	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89	76.4	62.9	49.4	36.8	31	29
Outlet Temp. (deg. C)	112	89	76.4	62.9	49.4	37	31
Temp. Rise (deg. C)	23	12.6	13.5	13.5	12.6	6	2
Flashing Temp. (deg. C)	119	92.2	82.2	69.9	56.4	40.3	36.4
Heat Transfer Rate (kJ/S)	164.495	89.628	95.680	95.346	88.715	122.327	40.752
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	15.804	7.890	11.229	12.564	12.238	5.791	6.348
U (kW/sq.m/K)	2.228	5.864	4.399	3.918	3.743	4.263	1.296
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1925	0.0190	0.0312	0.0592	0.0711	0.0385	0.5758

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 25, 94** **Time: 12:00** **Total Operation Time: 20 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.940	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89	76.5	63.1	50	37.5	31.4	29
Outlet Temp. (deg. C)	112	89	76.5	63.1	50	36	31.4
Temp. Rise (deg. C)	23	12.5	13.4	13.1	12.5	4.6	2.4
Flashing Temp. (deg. C)	119	93.8	82.9	70.2	56.9	41	35.7
Heat Transfer Rate (kJ/S)	164.495	88.918	94.975	92.530	88.024	93.780	48.904
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	15.804	9.750	11.865	12.529	12.092	7.052	5.412
U (kW/sq.m/K)	2.228	4.708	4.133	3.813	3.758	2.684	1.824
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1925	0.0609	0.0459	0.0662	0.0700	0.1766	0.3523

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 25, 94** **Time: 16:00** **Total Operation Time: 24 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.961	3.940	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89.5	76.5	63	50	37.4	31.5	28
Outlet Temp. (deg. C)	112	89.5	76.5	63	50	36	31.5
Temp. Rise (deg. C)	22.5	13	13.5	13	12.6	4.5	3.5
Flashing Temp. (deg. C)	118	94	83.1	70.1	56.9	40.8	35.5
Heat Transfer Rate (kj/S)	160.932	92.481	95.682	91.823	88.727	91.742	71.313
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	14.440	9.572	12.122	12.492	12.128	6.804	5.568
U (kW/sq.m/K)	2.385	4.988	4.075	3.795	3.777	2.721	2.585
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1628	0.0490	0.0493	0.0675	0.0687	0.1714	0.1908

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 25, 94** **Time: 20:00** **Total Operation Time: 28 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.940	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89.5	76.4	62.9	49.7	37	31.2	28
Outlet Temp. (deg. C)	112	89.5	76.4	62.9	49.7	36	31.2
Temp. Rise (deg. C)	22.5	13.1	13.5	13.2	12.7	4.8	3.2
Flashing Temp. (deg. C)	118	93.3	82.6	70.1	56.6	40.5	35.3
Heat Transfer Rate (kJ/S)	160.932	93.191	95.680	93.231	89.424	97.856	65.199
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	14.440	8.778	11.678	12.675	12.165	6.612	5.547
U (kW/sq.m/K)	2.385	5.481	4.230	3.797	3.795	2.986	2.372
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1628	0.0309	0.0403	0.0673	0.0674	0.1388	0.2255

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 26, 94** **Time: 00:00** **Total Operation Time: 32 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.961	3.940	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89	76.3	62.7	49.6	36.9	31.1	27
Outlet Temp. (deg. C)	112	89	76.3	62.7	49.6	35.5	31.1
Temp. Rise (deg. C)	23	12.7	13.6	13.1	12.7	4.4	4.1
Flashing Temp. (deg. C)	117.5	93.4	82.5	70	56.6	40.5	35.2
Heat Transfer Rate (kj/S)	164.495	90.338	96.385	92.521	89.422	89.697	83.530
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	13.980	9.356	11.713	12.747	12.274	6.970	5.915
U (kW/sq.m/K)	2.518	4.985	4.248	3.747	3.761	2.597	2.850
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1407	0.0491	0.0393	0.0708	0.0698	0.1890	0.1548

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 26, 94** **Time: 04:00** **Total Operation Time: 36 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.964
Inlet Temp. (deg. C)	89	76	62.7	49.6	36.9	31	27
Outlet Temp. (deg. C)	112	89	76	62.7	49.6	35	31
Temp. Rise (deg. C)	23	13	13.3	13.1	12.7	4	4
Flashing Temp. (deg. C)	118	93.2	82.3	69.9	56.7	40.6	35.2
Heat Transfer Rate (kJ/S)	164.495	92.468	94.255	92.521	89.422	81.539	81.492
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	14.598	9.221	11.718	12.638	12.383	7.421	5.979
U (kW/sq.m/K)	2.412	5.177	4.153	3.779	3.728	2.217	2.751
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1582	0.0416	0.0447	0.0685	0.0722	0.2550	0.1675

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 26, 94** **Time: 08:00** **Total Operation Time: 40 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kJ/kg/K)	3.960	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88	76.4	63.2	50	37.5	31.3	29.5
Outlet Temp. (deg. C)	112	88	76.4	63.2	50	37	31.3
Temp. Rise (deg. C)	24	11.6	13.2	13.2	12.5	5.7	1.8
Flashing Temp. (deg. C)	119	93.4	82.8	70.4	57.2	41	35.6
Heat Transfer Rate (kJ/S)	171.620	82.503	93.557	93.238	88.024	113.072	35.687
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	16.128	10.115	11.794	12.675	12.419	6.435	5.148
U (kW/sq.m/K)	2.277	4.211	4.095	3.798	3.659	3.546	1.399
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1827	0.0860	0.0481	0.0672	0.0772	0.0859	0.5187

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 26, 94** **Time: 12:00** **Total Operation Time: 44 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89	75.6	62.6	49.9	37.7	31.7	28.5
Outlet Temp. (deg. C)	112	89	75.6	62.6	49.9	36.5	31.7
Temp. Rise (deg. C)	23	13.4	13	12.7	12.2	4.8	3.2
Flashing Temp. (deg. C)	118.5	92.8	82.3	69.9	57	41.3	35.9
Heat Transfer Rate (kJ/S)	164.495	95.308	92.123	89.698	85.912	95.218	63.442
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	15.206	8.875	12.054	12.601	12.200	6.925	5.650
U (kW/sq.m/K)	2.315	5.544	3.946	3.675	3.636	2.775	2.266
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1755	0.0289	0.0574	0.0760	0.0790	0.1643	0.2452

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 26, 94** **Time: 16:00** **Total Operation Time: 48 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88.5	75.8	62.6	49.9	37.5	31.5	28
Outlet Temp. (deg. C)	112	88.5	75.8	62.6	49.9	36	31.5
Temp. Rise (deg. C)	23.5	12.7	13.2	12.7	12.4	4.5	3.5
Flashing Temp. (deg. C)	120	93.1	82.8	70.2	57	40.9	35.8
Heat Transfer Rate (kJ/S)	168.058	90.325	93.542	89.698	87.319	91.742	71.313
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	17.146	9.587	12.456	12.927	12.273	6.907	5.877
U (kW/sq.m/K)	2.098	4.864	3.877	3.582	3.673	2.680	2.448
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2203	0.0541	0.0618	0.0831	0.0762	0.1770	0.2123

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 26, 94** **Time: 20:00** **Total Operation Time: 52 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6480	6480	6480	6480	6480	18500	18500
Specific Heat (kj/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89	75.7	62.6	49.9	37.5	31.6	28
Outlet Temp. (deg. C)	112	89	75.7	62.6	49.9	36	31.6
Temp. Rise (deg. C)	23	13.3	13.1	12.7	12.4	4.4	3.6
Flashing Temp. (deg. C)	120	93	82.4	70	57.1	41	35.9
Heat Transfer Rate (kj/S)	163.989	94.307	92.547	89.422	87.050	89.704	73.351
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	16.980	9.082	12.090	12.710	12.382	6.970	5.919
U (kW/sq.m/K)	2.067	5.361	3.952	3.632	3.629	2.597	2.501
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2274	0.0350	0.0570	0.0792	0.0794	0.1890	0.2038

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 27, 94** **Time: 00:00** **Total Operation Time: 56 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kj/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88.5	75.9	62.8	50.1	37.9	31.9	28
Outlet Temp. (deg. C)	112	88.5	75.9	62.8	50.1	36	31.9
Temp. Rise (deg. C)	23.5	12.6	13.1	12.7	12.2	4.1	3.9
Flashing Temp. (deg. C)	121	92.7	82.6	70.4	57.5	41.3	36.2
Heat Transfer Rate (kj/S)	168.058	89.615	92.837	89.703	85.916	82.234	78.177
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.302	9.089	12.090	12.927	12.525	7.155	6.042
U (kW/sq.m/K)	1.965	5.090	3.964	3.583	3.541	2.319	2.611
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2524	0.0449	0.0562	0.0831	0.0863	0.2351	0.1869

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 27, 94** **Time: 04:00** **Total Operation Time: 60 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88.5	75.8	62.8	50	37.7	31.6	28
Outlet Temp. (deg. C)	112	88.5	75.8	62.8	50	36	31.6
Temp. Rise (deg. C)	23.5	12.7	13	12.8	12.3	4.4	3.6
Flashing Temp. (deg. C)	121	92.8	82.1	70.1	57.3	41	36
Heat Transfer Rate (kj/S)	168.058	90.325	92.127	90.408	86.617	89.704	73.351
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.302	9.239	11.612	12.638	12.454	6.970	6.022
U (kW/sq.m/K)	1.965	5.047	4.096	3.693	3.591	2.597	2.458
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2524	0.0466	0.0481	0.0747	0.0824	0.1890	0.2107

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 27, 94** **Time: 08:00** **Total Operation Time: 64 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.900	3.968	3.966
Inlet Temp. (deg. C)	88.5	76.1	63	50.3	38	31.7	30
Outlet Temp. (deg. C)	112	88.5	76.1	63	50.3	37	31.7
Temp. Rise (deg. C)	23.5	12.4	13.1	12.7	12.3	5.3	1.7
Flashing Temp. (deg. C)	121	92.7	82.2	70.5	57.5	41.3	36.2
Heat Transfer Rate (kJ/S)	168.058	88.195	92.842	89.707	86.623	105.140	33.707
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.302	9.023	11.425	12.818	12.345	6.599	5.305
U (kW/sq.m/K)	1.965	5.046	4.195	3.613	3.622	3.215	1.282
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2524	0.0466	0.0423	0.0807	0.0800	0.1150	0.5838

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 27, 94** **Time: 12:00** **Total Operation Time: 68 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	88.5	75.7	62.8	50.1	37.9	32.6	29
Outlet Temp. (deg. C)	112	88.5	75.7	62.8	50.1	37	32.6
Temp. Rise (deg. C)	23.5	12.8	12.9	12.7	12.2	4.4	3.6
Flashing Temp. (deg. C)	121	93.2	82.7	70.4	57.5	41.8	36.1
Heat Transfer Rate (kJ/S)	168.058	91.035	91.418	89.703	85.916	87.292	71.379
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.302	9.737	12.347	12.927	12.525	6.763	5.090
U (kW/sq.m/K)	1.965	4.827	3.822	3.583	3.541	2.605	2.830
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2524	0.0557	0.0655	0.0831	0.0863	0.1879	0.1573

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 27, 94** **Time: 16:00** **Total Operation Time: 72 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18300	18300
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.901	3.968	3.965
Inlet Temp. (deg. C)	88.5	75.8	62.9	50.4	38.5	32.5	29
Outlet Temp. (deg. C)	112	88.5	75.8	62.9	50.4	37	32.5
Temp. Rise (deg. C)	23.5	12.7	12.9	12.5	11.9	4.5	3.5
Flashing Temp. (deg. C)	122	93.4	82.8	70.7	57.9	41.8	36.7
Heat Transfer Rate (kJ/S)	168.058	90.325	91.420	88.295	83.812	90.764	70.552
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	19.438	9.932	12.347	13.069	12.521	6.804	5.774
U (kW/sq.m/K)	1.850	4.695	3.823	3.488	3.456	2.692	2.466
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2840	0.0615	0.0655	0.0906	0.0933	0.1754	0.2095

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 27, 94** **Time: 20:00** **Total Operation Time: 76 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.901	3.968	3.965
Inlet Temp. (deg. C)	88.5	75.8	62.9	50.4	38.1	32	29
Outlet Temp. (deg. C)	112	88.5	75.8	62.9	50.4	37	32
Temp. Rise (deg. C)	23.5	12.7	12.9	12.5	12.3	5	3
Flashing Temp. (deg. C)	122	93.4	82.8	70.7	57.9	41.6	36.5
Heat Transfer Rate (kJ/S)	168.058	90.325	91.420	88.295	86.625	100.293	60.141
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	19.438	9.932	12.347	13.069	12.670	6.796	5.873
U (kW/sq.m/K)	1.850	4.695	3.823	3.488	3.530	2.978	2.066
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2840	0.0615	0.0655	0.0906	0.0872	0.1397	0.2878

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 28, 94** **Time: 00:00** **Total Operation Time: 80 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88.5	75.7	62.7	50.1	37.9	31.9	28.5
Outlet Temp. (deg. C)	112	88.5	75.7	62.7	50.1	36	31.9
Temp. Rise (deg. C)	23.5	12.8	13	12.6	12.2	4.1	3.4
Flashing Temp. (deg. C)	122.5	93.2	82.7	70.7	57.8	41.4	36.3
Heat Transfer Rate (kJ/S)	168.058	91.035	92.125	88.995	85.916	82.234	68.157
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	20.000	9.737	12.383	13.321	12.849	7.258	5.939
U (kW/sq.m/K)	1.798	4.827	3.841	3.449	3.452	2.286	2.316
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2996	0.0557	0.0643	0.0939	0.0936	0.2413	0.2357

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 28, 94** **Time: 04:00** **Total Operation Time: 84 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kj/kg/K)	3.961	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88.5	75.7	62.8	50.2	37.9	31.8	28
Outlet Temp. (deg. C)	112	88.5	75.7	62.8	50.2	36	31.8
Temp. Rise (deg. C)	23.5	12.8	12.9	12.6	12.3	4.2	3.8
Flashing Temp. (deg. C)	124	92.3	81.9	70.6	57.7	41.4	36.3
Heat Transfer Rate (kj/S)	168.058	91.035	91.418	88.998	86.621	84.239	76.172
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.666	8.681	11.465	13.106	12.670	7.300	6.207
U (kW/sq.m/K)	1.660	5.414	4.116	3.506	3.529	2.329	2.476
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3460	0.0332	0.0469	0.0892	0.0872	0.2333	0.2078

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 28, 94** **Time: 08:00** **Total Operation Time: 88 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kj/kg/K)	3.960	3.939	3.925	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	88	75.5	62.5	49.9	37.7	31.7	29.5
Outlet Temp. (deg. C)	112	88	75.5	62.5	49.9	37	31.7
Temp. Rise (deg. C)	24	12.5	13	12.6	12.2	5.3	2.2
Flashing Temp. (deg. C)	124	92.1	82.1	70.3	57.4	41.2	36
Heat Transfer Rate (kj/S)	171.620	88.892	92.120	88.991	85.912	106.309	44.104
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	8.939	11.943	13.106	12.633	6.493	5.324
U (kW/sq.m/K)	1.681	5.134	3.982	3.506	3.511	3.304	1.671
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3383	0.0433	0.0551	0.0892	0.0888	0.1066	0.4022

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 28, 94** **Time: 12:00** **Total Operation Time: 92 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K	3.960	3.939	3.925	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	88	75.6	62.8	50.4	37.7	32	29
Outlet Temp. (deg. C)	112	88	75.6	62.8	50.4	37	32
Temp. Rise (deg. C)	24	12.4	12.8	12.4	12.7	5	3
Flashing Temp. (deg. C)	124	93.4	82.9	70.9	58.1	41.6	36.5
Heat Transfer Rate (kJ/S)	171.620	88.182	90.708	87.587	89.438	101.947	61.132
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	10.396	12.638	13.354	13.035	6.796	5.873
U (kW/sq.m/K)	1.681	4.379	3.706	3.386	3.542	3.027	2.101
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3383	0.0768	0.0738	0.0992	0.0862	0.1343	0.2800

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 28, 94** **Time: 16:00** **Total Operation Time: 96 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.960	3.939	3.925	3.912	3.901	3.968	3.965
Inlet Temp. (deg. C)	88	75.5	62.7	50.3	38.1	32.1	29
Outlet Temp. (deg. C)	112	88	75.5	62.7	50.3	37	32.1
Temp. Rise (deg. C)	24	12.5	12.8	12.4	12.2	4.9	3.1
Flashing Temp. (deg. C)	124	93.3	82.8	70.7	58	41.6	36.6
Heat Transfer Rate (kJ/S)	171.620	88.892	90.705	87.585	85.920	99.908	63.170
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	10.318	12.638	13.247	12.849	6.756	5.915
U (kW/sq.m/K)	1.681	4.448	3.705	3.413	3.452	2.984	2.155
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3383	0.0733	0.0738	0.0969	0.0936	0.1390	0.2680

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 28, 94** **Time: 20:00** **Total Operation Time: 100 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6350	6350	6350	6350	6350	18300	18300
Specific Heat (kJ/kg/K)	3.960	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88	75.6	62.6	50.2	38.1	31.9	29
Outlet Temp. (deg. C)	112	88	75.6	62.6	50.2	36.5	31.9
Temp. Rise (deg. C)	24	12.4	13	12.4	12.1	4.6	2.9
Flashing Temp. (deg. C)	124	93.2	82.7	70.6	57.9	41.5	36.4
Heat Transfer Rate (kJ/S)	167.660	86.147	89.997	85.562	83.248	92.773	58.455
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	10.170	12.492	13.247	12.812	7.052	5.830
U (kW/sq.m/K)	1.643	4.373	3.719	3.335	3.355	2.655	2.023
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3524	0.0772	0.0728	0.1038	0.1020	0.1806	0.2982

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 29, 94** **Time: 00:00** **Total Operation Time: 104 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6350	6350	6350	6350	6350	18200	18200
Specific Heat (kJ/kg/K)	3.960	3.939	3.925	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	88	75.4	62.4	49.9	37.7	31.8	28.5
Outlet Temp. (deg. C)	112	88	75.4	62.4	49.9	36	31.8
Temp. Rise (deg. C)	24	12.6	13	12.5	12.2	4.2	3.3
Flashing Temp. (deg. C)	124	92.8	82.2	70.4	57.6	41.2	36.1
Heat Transfer Rate (kJ/S)	167.660	87.534	89.992	86.246	83.930	84.239	66.152
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	9.784	12.164	13.284	12.849	7.094	5.794
U (kW/sq.m/K)	1.643	4.619	3.820	3.352	3.372	2.396	2.304
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3524	0.0650	0.0657	0.1023	0.1005	0.2212	0.2380

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 29, 84** **Time: 08:00** **Total Operation Time: 112 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6350	6350	6350	6350	6350	18400	18400
Specific Heat (kJ/kg/K)	3.961	3.939	3.925	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	88.5	75.6	62.5	49.9	37.4	32.2	29
Outlet Temp. (deg. C)	112	88.5	75.6	62.5	49.9	37	32.2
Temp. Rise (deg. C)	23.5	12.9	13.1	12.6	12.5	4.8	3.2
Flashing Temp. (deg. C)	126	94.2	83.7	71.6	58.7	42.1	36.8
Heat Transfer Rate (kJ/S)	164.180	89.628	90.688	86.937	85.990	97.341	64.856
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	23.851	10.907	13.616	14.499	14.141	7.237	6.060
U (kW/sq.m/K)	1.473	4.242	3.439	3.096	3.139	2.714	2.160
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.4224	0.0842	0.0947	0.1270	0.1225	0.1723	0.2669

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 29, 94** **Time: 12:00** **Total Operation Time: 116 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18400	18400
Specific Heat (kj/kg/K)	3.961	3.939	3.925	3.912	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.5	75.8	62.9	50.4	38.2	32.3	29.5
Outlet Temp. (deg. C)	112	88.5	75.8	62.9	50.4	37	32.3
Temp. Rise (deg. C)	23.5	12.7	12.9	12.5	12.2	4.7	2.8
Flashing Temp. (deg. C)	125	94.2	83.7	71.6	58.7	42.1	36.8
Heat Transfer Rate (kj/S)	168.058	90.325	91.420	88.295	85.922	95.314	56.751
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	22.763	10.837	13.325	14.034	13.493	7.196	5.788
U (kW/sq.m/K)	1.580	4.303	3.542	3.248	3.287	2.673	1.979
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3764	0.0809	0.0863	0.1118	0.1081	0.1781	0.3093

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 29, 94** **Time: 16:00** **Total Operation Time: 120 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18300	18300
Specific Heat (kj/kg/K)	3.960	3.938	3.924	3.912	3.901	3.968	3.965
Inlet Temp. (deg. C)	88	75.3	62.4	50.2	38.3	32.5	28
Outlet Temp. (deg. C)	112	88	75.3	62.4	50.2	37	32.5
Temp. Rise (deg. C)	24	12.7	12.9	12.2	11.9	4.5	4.5
Flashing Temp. (deg. C)	124	93.5	83.3	71.1	58.4	42	36.8
Heat Transfer Rate (kj/S)	171.620	90.312	91.408	86.168	83.808	90.764	90.704
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	10.613	13.433	13.920	13.273	7.011	6.284
U (kW/sq.m/K)	1.681	4.393	3.513	3.196	3.260	2.612	2.913
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3383	0.0761	0.0886	0.1168	0.1107	0.1867	0.1472

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 29, 94** **Time: 20:00** **Total Operation Time: 124 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18400	18400
Specific Heat (kj/kg/K)	3.960	3.938	3.924	3.911	3.900	3.968	3.965
Inlet Temp. (deg. C)	88	75	62	49.6	37.5	32	28.5
Outlet Temp. (deg. C)	112	88	75	62	49.6	37	32
Temp. Rise (deg. C)	24	13	13	12.4	12.1	5	3.5
Flashing Temp. (deg. C)	124	93.1	82.5	70.5	57.8	41.5	36.4
Heat Transfer Rate (kj/S)	171.620	92.441	92.108	87.570	85.203	101.396	70.933
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	10.263	12.929	13.783	13.348	6.692	5.980
U (kW/sq.m/K)	1.681	4.650	3.678	3.280	3.295	3.058	2.393
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3383	0.0635	0.0758	0.1088	0.1074	0.1310	0.2217

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 30, 94** **Time: 00:00** **Total Operation Time: 128 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18400	18400
Specific Heat (kJ/kg/K)	3.960	3.939	3.925	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	88	75.6	62.4	49.7	37.5	32.1	28.5
Outlet Temp. (deg. C)	112	88	75.6	62.4	49.7	37	32.1
Temp. Rise (deg. C)	24	12.4	13.2	12.7	12.2	4.9	3.6
Flashing Temp. (deg. C)	125	93.3	82.4	70.7	57.8	41.4	36.3
Heat Transfer Rate (kJ/S)	168.980	86.826	92.098	88.314	84.587	99.368	72.960
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	22.945	10.283	12.236	13.681	13.279	6.547	5.815
U (kW/sq.m/K)	1.576	4.359	3.886	3.332	3.289	3.063	2.532
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3780	0.0779	0.0613	0.1040	0.1080	0.1304	0.1989

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 30, 94** **Time: 04:00** **Total Operation Time: 132 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18400	18400
Specific Heat (kJ/kg/K)	3.960	3.938	3.924	3.911	3.900	3.968	3.965
Inlet Temp. (deg. C)	87	74.8	61.9	49.4	37.4	32.2	28
Outlet Temp. (deg. C)	112	87	74.8	61.9	49.4	36.5	32.2
Temp. Rise (deg. C)	25	12.2	12.9	12.5	12	4.3	4.2
Flashing Temp. (deg. C)	124	92.2	81.5	70	57.6	41.6	36.6
Heat Transfer Rate (kJ/S)	175.993	85.403	89.989	86.915	83.196	87.198	85.118
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	22.202	10.101	12.018	13.392	13.310	7.032	6.267
U (kW/sq.m/K)	1.697	4.365	3.866	3.351	3.227	2.502	2.741
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3330	0.0776	0.0626	0.1024	0.1138	0.2036	0.1688

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 30, 94** **Time: 08:00** **Total Operation Time: 136 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18400	18400
Specific Heat (kj/kg/K)	3.960	3.939	3.924	3.911	3.900	3.968	3.966
Inlet Temp. (deg. C)	88	75.4	62.3	49.7	37.3	32	30
Outlet Temp. (deg. C)	112	88	75.4	62.3	49.7	37	32
Temp. Rise (deg. C)	24	12.6	13.1	12.6	12.4	5	2
Flashing Temp. (deg. C)	126	93.2	82.8	71	58	41.4	36.2
Heat Transfer Rate (kj/S)	168.980	88.224	91.397	87.618	85.971	101.396	40.537
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	24.035	10.239	12.856	14.072	13.569	6.587	5.135
U (kW/sq.m/K)	1.505	4.448	3.670	3.214	3.271	3.106	1.593
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.4082	0.0733	0.0764	0.1150	0.1096	0.1258	0.4317

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 30, 94** **Time: 20:00** **Total Operation Time: 148 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89.5	77.2	63.6	50.4	37.5	32.1	28.5
Outlet Temp. (deg. C)	112	89.5	77.2	63.6	50.4	36	32.1
Temp. Rise (deg. C)	22.5	12.3	13.6	13.2	12.9	3.9	3.6
Flashing Temp. (deg. C)	114	93.8	82.7	69.9	56.7	41.2	36.4
Heat Transfer Rate (kJ/S)	158.456	86.164	94.925	91.813	89.447	77.364	71.374
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	8.980	9.106	10.924	11.683	11.576	6.969	5.919
U (kW/sq.m/K)	3.777	4.885	4.486	4.057	3.989	2.240	2.433
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0084	0.0532	0.0268	0.0504	0.0546	0.2503	0.2149

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 31, 94** **Time: 00:00** **Total Operation Time: 152 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89	77.2	63.6	50.2	37.3	31.9	28.5
Outlet Temp. (deg. C)	112	89	77.2	63.6	50.2	36	31.9
Temp. Rise (deg. C)	23	11.8	13.6	13.4	12.9	4.1	3.4
Flashing Temp. (deg. C)	114	93.6	82.7	70	56.6	41	36.1
Heat Transfer Rate (kJ/S)	161.965	82.656	94.925	93.201	89.443	81.330	67.408
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.106	9.282	10.924	11.865	11.687	6.847	5.733
U (kW/sq.m/K)	3.807	4.597	4.486	4.055	3.951	2.397	2.373
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0063	0.0660	0.0268	0.0505	0.0570	0.2211	0.2254

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 31, 94** **Time: 04:00** **Total Operation Time: 156 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.912	3.900	3.967	3.965
Inlet Temp. (deg. C)	89	77.1	63.5	50.1	37.2	31.8	28.5
Outlet Temp. (deg. C)	112	89	77.1	63.5	50.1	36	31.8
Temp. Rise (deg. C)	23	11.9	13.6	13.4	12.9	4.2	3.3
Flashing Temp. (deg. C)	114	93.3	82.5	70.1	56.5	40.8	36.1
Heat Transfer Rate (kJ/S)	161.965	83.355	94.922	93.199	89.441	83.313	65.425
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.106	8.972	10.810	12.087	11.687	6.681	5.794
U (kW/sq.m/K)	3.807	4.797	4.533	3.981	3.951	2.516	2.279
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0063	0.0570	0.0245	0.0551	0.0570	0.2013	0.2428

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 31, 94** **Time: 08:00** **Total Operation Time: 160 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6490	6490	6490	6490	6490	18200	18200
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.912	3.900	3.967	3.966
Inlet Temp. (deg. C)	89	77.1	63.7	50.3	37.4	31.9	30
Outlet Temp. (deg. C)	112	89	77.1	63.7	50.3	36.5	31.9
Temp. Rise (deg. C)	23	11.9	13.4	13.4	12.9	4.6	1.9
Flashing Temp. (deg. C)	115.5	93.5	82.7	70.2	56.8	41	36.3
Heat Transfer Rate (kJ/S)	164.242	84.527	94.844	94.514	90.703	92.266	38.092
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.361	9.202	10.969	11.976	11.797	6.532	5.293
U (kW/sq.m/K)	3.094	4.742	4.464	4.074	3.969	2.850	1.452
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0668	0.0594	0.0279	0.0494	0.0559	0.1548	0.4926

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 31, 94** **Time: 12:00** **Total Operation Time: 164 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	89.5	77.3	64.1	51	38.4	32.2	30
Outlet Temp. (deg. C)	112	89.5	77.3	64.1	51	36.5	32.2
Temp. Rise (deg. C)	22.5	12.2	13.2	13.1	12.6	4.3	2.2
Flashing Temp. (deg. C)	116.5	94.5	83.7	71	57.7	41.6	37
Heat Transfer Rate (kj/S)	160.932	86.800	93.580	92.553	88.747	86.250	44.107
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	12.557	9.875	11.794	12.310	11.909	7.032	5.831
U (kW/sq.m/K)	2.743	4.538	4.096	3.882	3.847	2.475	1.526
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1082	0.0688	0.0480	0.0615	0.0639	0.2080	0.4591

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 31, 94** **Time: 16:00** **Total Operation Time: 168 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.965
Inlet Temp. (deg. C)	89.5	77.2	63.9	50.9	38.2	32.3	29
Outlet Temp. (deg. C)	112	89.5	77.2	63.9	50.9	37	32.3
Temp. Rise (deg. C)	22.5	12.3	13.3	13	12.7	4.7	3.3
Flashing Temp. (deg. C)	116	94.1	83.1	70.7	57.5	41.6	37
Heat Transfer Rate (kJ/S)	160.932	87.511	94.285	91.843	89.448	93.242	65.429
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.899	9.452	11.272	12.164	11.836	6.677	6.204
U (kW/sq.m/K)	2.895	4.780	4.318	3.898	3.902	2.818	2.128
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0891	0.0577	0.0355	0.0605	0.0602	0.1588	0.2738

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: October 31, 94** **Time: 20:00** **Total Operation Time: 172 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.901	3.967	3.965
Inlet Temp. (deg. C)	89	77.1	63.7	50.6	37.8	32.2	29
Outlet Temp. (deg. C)	112	89	77.1	63.7	50.6	36	32.2
Temp. Rise (deg. C)	23	11.9	13.4	13.1	12.8	3.8	3.2
Flashing Temp. (deg. C)	117	94	83	70.7	57.3	41.5	36.7
Heat Transfer Rate (kj/S)	164.495	84.657	94.990	92.544	90.146	75.381	63.446
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	13.351	9.771	11.307	12.419	11.982	7.234	5.957
U (kW/sq.m/K)	2.637	4.473	4.337	3.847	3.884	2.103	2.149
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1228	0.0721	0.0345	0.0639	0.0614	0.2795	0.2692

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 01, 94** **Time: 00:00** **Total Operation Time: 176 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18000	18000
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.900	3.968	3.965
Inlet Temp. (deg. C)	89	77.2	63.8	50.5	37.7	32.2	28.5
Outlet Temp. (deg. C)	112	89	77.2	63.8	50.5	36.5	32.2
Temp. Rise (deg. C)	23	11.8	13.4	13.3	12.8	4.3	3.7
Flashing Temp. (deg. C)	117.5	93.8	83.1	70.8	57.2	41.3	36.6
Heat Transfer Rate (kj/S)	161.965	82.656	93.531	92.512	88.757	85.303	73.357
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	13.980	9.510	11.307	12.492	11.982	6.722	6.063
U (kW/sq.m/K)	2.480	4.487	4.271	3.823	3.824	2.561	2.442
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1469	0.0713	0.0381	0.0655	0.0654	0.1945	0.2135

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 01, 94** **Time: 04:00** **Total Operation Time: 180 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6400	6400	6400	6400	6400	18200	18200
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.900	3.968	3.965
Inlet Temp. (deg. C)	89	77.1	63.7	50.4	37.5	32	28.5
Outlet Temp. (deg. C)	112	89	77.1	63.7	50.4	36.5	32
Temp. Rise (deg. C)	23	11.9	13.4	13.3	12.9	4.5	3.5
Flashing Temp. (deg. C)	118	94	83.4	70.8	57.1	41.1	36.4
Heat Transfer Rate (kj/S)	161.965	83.355	93.529	92.509	89.447	90.261	70.162
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	14.598	9.771	11.754	12.601	12.018	6.596	5.980
U (kW/sq.m/K)	2.375	4.404	4.108	3.790	3.843	2.761	2.367
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1647	0.0755	0.0473	0.0678	0.0642	0.1661	0.2263

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 01, 94** **Time: 08:00** **Total Operation Time: 184 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6450	6450	6450	6450	6450	18000	18000
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	89	77.3	64.1	50.9	38.2	32.4	30
Outlet Temp. (deg. C)	112	89	77.3	64.1	50.9	38	32.4
Temp. Rise (deg. C)	23	11.7	13.2	13.2	12.7	5.6	2.4
Flashing Temp. (deg. C)	118.5	94.1	83.4	71	57.7	41.7	36.8
Heat Transfer Rate (kj/S)	163.230	82.597	92.860	92.541	88.760	111.106	47.589
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	15.206	9.814	11.460	12.346	12.055	6.076	5.513
U (kW/sq.m/K)	2.298	4.345	4.183	3.870	3.801	3.690	1.742
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1788	0.0786	0.0430	0.0623	0.0670	0.0749	0.3780

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 01, 94** **Time: 12:00** **Total Operation Time: 188 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kJ/kg/K)	3.961	3.940	3.927	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	89	77.4	64.6	51.5	38.8	32.8	30
Outlet Temp. (deg. C)	112	89	77.4	64.6	51.5	38	32.8
Temp. Rise (deg. C)	23	11.6	12.8	13.1	12.7	5.2	2.8
Flashing Temp. (deg. C)	118.5	95	84.3	72	58.5	42.2	37.1
Heat Transfer Rate (kJ/S)	164.495	82.527	90.752	92.565	89.461	104.320	56.139
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	15.206	10.779	12.201	12.856	12.274	6.455	5.583
U (kW/sq.m/K)	2.315	3.953	3.840	3.717	3.763	3.261	2.029
Clean-U Value (KW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1755	0.1015	0.0643	0.0730	0.0697	0.1105	0.2968

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 01, 94** **Time: 16:00** **Total Operation Time: 192 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.940	3.927	3.914	3.902	3.968	3.966
Inlet Temp. (deg. C)	89	77.5	64.7	51.8	39.6	32.2	29.5
Outlet Temp. (deg. C)	112	89	77.5	64.7	51.8	37	32.2
Temp. Rise (deg. C)	23	11.5	12.8	12.9	12.2	4.8	2.7
Flashing Temp. (deg. C)	118.5	94.8	84.2	71.8	58.8	42.6	39.3
Heat Transfer Rate (kJ/S)	164.495	81.816	90.754	91.156	85.950	97.870	55.022
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	15.206	10.523	11.982	12.456	12.091	7.754	8.378
U (kW/sq.m/K)	2.315	4.014	3.910	3.778	3.670	2.547	1.325
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1755	0.0976	0.0596	0.0686	0.0764	0.1965	0.5585

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 01, 94** **Time: 20:00** **Total Operation Time: 196 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kj/kg/K)	3.961	3.940	3.927	3.914	3.902	3.968	3.965
Inlet Temp. (deg. C)	89	77.5	64.6	51.6	39.2	32	29
Outlet Temp. (deg. C)	112	89	77.5	64.6	51.6	37	32
Temp. Rise (deg. C)	23	11.5	12.9	13	12.4	5	3
Flashing Temp. (deg. C)	120	94.3	84	71.8	58.5	42.3	38.9
Heat Transfer Rate (kj/S)	164.495	81.816	91.462	91.860	87.353	100.293	60.141
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	16.980	9.968	11.797	12.602	12.055	7.525	8.310
U (kW/sq.m/K)	2.073	4.237	4.002	3.763	3.741	2.689	1.460
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2259	0.0845	0.0538	0.0696	0.0712	0.1757	0.4887

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 02, 94** **Time: 00:00** **Total Operation Time: 200 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.913	3.902	3.968	3.965
Inlet Temp. (deg. C)	89	77.2	64.3	51.5	39.2	32.3	29
Outlet Temp. (deg. C)	112	89	77.2	64.3	51.5	37	32.3
Temp. Rise (deg. C)	23	11.8	12.9	12.8	12.3	4.7	3.3
Flashing Temp. (deg. C)	120.5	94.8	84	71.7	58.6	42.7	38.9
Heat Transfer Rate (kJ/S)	164.495	83.947	91.455	90.442	86.647	93.242	65.429
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	17.558	10.630	12.128	12.746	12.237	7.816	8.139
U (kW/sq.m/K)	2.005	4.077	3.893	3.663	3.656	2.407	1.622
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2423	0.0938	0.0608	0.0769	0.0775	0.2193	0.4204

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 02, 94** **Time: 04:00** **Total Operation Time: 204 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kj/kg/K)	3.961	3.940	3.927	3.913	3.901	3.968	3.965
Inlet Temp. (deg. C)	89	77.3	64.5	51.5	39	32.3	29
Outlet Temp. (deg. C)	112	89	77.3	64.5	51.5	37	32.3
Temp. Rise (deg. C)	23	11.7	12.8	13	12.5	4.7	3.3
Flashing Temp. (deg. C)	120.5	94.5	83.7	71.9	58.6	42.6	38.5
Heat Transfer Rate (kJ/S)	164.495	83.237	90.749	91.857	88.054	93.242	65.429
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	17.558	10.262	11.651	12.820	12.310	7.713	7.733
U (kW/sq.m/K)	2.005	4.188	4.021	3.699	3.693	2.440	1.707
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2423	0.0873	0.0526	0.0743	0.0747	0.2138	0.3896

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 02, 94** **Time: 08:00** **Total Operation Time: 208 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kJ/kg/K)	3.961	3.940	3.927	3.914	3.902	3.968	3.966
Inlet Temp. (deg. C)	89	77.4	64.7	51.7	39.4	32.3	31
Outlet Temp. (deg. C)	112	89	77.4	64.7	51.7	38	32.3
Temp. Rise (deg. C)	23	11.6	12.7	13	12.3	5.7	1.3
Flashing Temp. (deg. C)	120.5	94.3	83.7	71.9	58.8	42.8	38.7
Heat Transfer Rate (kJ/S)	164.495	82.527	90.044	91.862	86.651	113.089	25.779
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	17.558	10.003	11.505	12.602	12.237	7.282	7.030
U (kW/sq.m/K)	2.005	4.259	4.041	3.763	3.656	3.134	0.740
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2423	0.0833	0.0514	0.0696	0.0775	0.1230	1.1553

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 02, 94** **Time: 12:00** **Total Operation Time: 212 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18000	18000
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.902	3.968	3.966
Inlet Temp. (deg. C)	88.5	77	64.2	51.5	39.4	33.2	30.5
Outlet Temp. (deg. C)	112	88.5	77	64.2	51.5	38	33.2
Temp. Rise (deg. C)	23.5	11.5	12.8	12.7	12.1	4.8	2.7
Flashing Temp. (deg. C)	121	94.9	83.2	72	59	43	38.3
Heat Transfer Rate (kj/S)	168.058	81.805	90.742	89.734	85.240	95.240	53.542
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.302	11.181	11.430	13.143	12.596	7.133	6.355
U (kW/sq.m/K)	1.965	3.777	4.099	3.525	3.494	2.694	1.700
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2524	0.1132	0.0479	0.0876	0.0902	0.1751	0.3921

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 02, 94** **Time: 16:00** **Total Operation Time: 216 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17500	17500
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.5	76.6	64	51.2	38.9	33.3	30
Outlet Temp. (deg. C)	112	88.5	76.6	64	51.2	38	33.3
Temp. Rise (deg. C)	23.5	11.9	12.6	12.8	12.3	4.7	3.3
Flashing Temp. (deg. C)	121	94.6	83.1	71.9	58.8	43.1	37.6
Heat Transfer Rate (kJ/S)	168.058	84.645	89.317	90.435	86.641	90.666	63.621
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.302	10.997	11.690	13.288	12.778	7.196	5.794
U (kW/sq.m/K)	1.965	3.974	3.945	3.514	3.500	2.542	2.216
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2524	0.1001	0.0574	0.0885	0.0896	0.1972	0.2552

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 02, 94** **Time: 20:00** **Total Operation Time: 220 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17200	17200
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.5	76.8	63.9	51.1	38.6	33.1	29
Outlet Temp. (deg. C)	112	88.5	76.8	63.9	51.1	38	33.1
Temp. Rise (deg. C)	23.5	11.7	12.9	12.8	12.5	4.9	4.1
Flashing Temp. (deg. C)	121.5	94.8	83.2	71.9	58.7	43	37.3
Heat Transfer Rate (kJ/S)	168.058	83.225	91.445	90.433	88.046	92.902	77.682
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.872	11.145	11.687	13.396	12.853	7.173	6.019
U (kW/sq.m/K)	1.906	3.855	4.040	3.485	3.537	2.613	2.604
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2683	0.1079	0.0515	0.0909	0.0867	0.1866	0.1879

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 03, 94** **Time: 00:00** **Total Operation Time: 224 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17200	17200
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.5	76.9	64.1	51.1	38.6	33.1	29
Outlet Temp. (deg. C)	112	88.5	76.9	64.1	51.1	37.5	33.1
Temp. Rise (deg. C)	23.5	11.6	12.8	13	12.5	4.4	4.1
Flashing Temp. (deg. C)	121.5	94.7	83.4	71.9	58.7	43	37.2
Heat Transfer Rate (kJ/S)	168.058	82.515	90.740	91.848	88.046	83.419	77.682
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	18.872	10.999	11.761	13.254	12.853	7.486	5.915
U (kW/sq.m/K)	1.906	3.873	3.983	3.578	3.537	2.249	2.650
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2683	0.1067	0.0550	0.0834	0.0867	0.2486	0.1813

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 03, 94** **Time: 04:00** **Total Operation Time: 228 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17200	17200
Specific Heat (kJ/kg/K)	3.961	3.939	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.2	76.6	63.8	50.8	38.3	33	29
Outlet Temp. (deg. C)	112	88.2	76.6	63.8	50.8	37.5	33
Temp. Rise (deg. C)	23.8	11.6	12.8	13	12.5	4.5	4
Flashing Temp. (deg. C)	122	93.7	83.7	71.4	58.2	42.6	36.9
Heat Transfer Rate (kJ/S)	170.195	82.508	90.732	91.841	88.040	85.314	75.787
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	19.542	10.226	12.420	13.037	12.636	7.114	5.667
U (kW/sq.m/K)	1.864	4.165	3.772	3.637	3.597	2.420	2.699
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.2801	0.0886	0.0691	0.0789	0.0819	0.2172	0.1745

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 03, 94** **Time: 08:00** **Total Operation Time: 232 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17500	17500
Specific Heat (kJ/kg/K)	3.960	3.939	3.926	3.913	3.901	3.968	3.967
Inlet Temp. (deg. C)	88	76.6	63.8	50.8	38.3	33	33
Outlet Temp. (deg. C)	112	88	76.6	63.8	50.8	38	33
Temp. Rise (deg. C)	24	11.4	12.8	13	12.5	5	0
Flashing Temp. (deg. C)	123	93.7	83.4	71.1	58.1	42.6	36.8
Heat Transfer Rate (kJ/S)	171.620	81.083	90.732	91.841	88.040	96.451	0.000
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	20.735	10.377	12.091	12.711	12.527	6.796	ERR
U (kW/sq.m/K)	1.771	4.034	3.874	3.730	3.628	2.864	ERR
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3081	0.0964	0.0621	0.0720	0.0795	0.1531	ERR

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 03, 94** **Time: 12:00** **Total Operation Time: 236 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17500	17500
Specific Heat (kJ/kg/K)	3.960	3.939	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88	76.9	64.2	51.4	39.1	33.4	30
Outlet Temp. (deg. C)	112	88	76.9	64.2	51.4	38	33.4
Temp. Rise (deg. C)	24	11.1	12.7	12.8	12.3	4.6	3.4
Flashing Temp. (deg. C)	123	94.6	84.5	72.3	59.2	43.2	37.5
Heat Transfer Rate (kJ/S)	171.620	78.952	90.032	90.440	86.645	88.737	65.549
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	20.735	11.252	12.927	13.504	12.994	7.259	5.630
U (KW/sq.m/K)	1.771	3.622	3.596	3.458	3.442	2.467	2.349
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3081	0.1245	0.0820	0.0931	0.0944	0.2093	0.2295

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 03, 94** **Time: 16:00** **Total Operation Time: 240 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17500	17500
Specific Heat (kj/kg/K)	3.960	3.939	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88	76.5	63.7	50.8	38.4	33.1	29
Outlet Temp. (deg. C)	112	88	76.5	63.7	50.8	38	33.1
Temp. Rise (deg. C)	24	11.5	12.8	12.9	12.4	4.9	4.1
Flashing Temp. (deg. C)	123.5	94.6	84.3	71.9	58.8	42.8	37.1
Heat Transfer Rate (kj/S)	171.620	81.793	90.730	91.134	87.336	94.522	79.037
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.292	11.399	13.180	13.649	13.247	6.965	5.811
U (kW/sq.m/K)	1.725	3.704	3.554	3.447	3.404	2.739	2.745
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3233	0.1184	0.0853	0.0940	0.0977	0.1691	0.1683

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 03, 94** **Time: 20:00** **Total Operation Time: 244 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17500	17500
Specific Heat (kJ/kg/K)	3.960	3.939	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88	76.7	63.8	50.9	38.3	33.1	29
Outlet Temp. (deg. C)	112	88	76.7	63.8	50.9	38	33.1
Temp. Rise (deg. C)	24	11.3	12.9	12.9	12.6	4.9	4.1
Flashing Temp. (deg. C)	124	95	84.4	72	58.9	43	37
Heat Transfer Rate (kJ/S)	171.620	80.373	91.442	91.136	88.745	94.522	79.037
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	21.846	11.759	13.109	13.649	13.321	7.173	5.707
U (kW/sq.m/K)	1.681	3.529	3.601	3.447	3.439	2.659	2.795
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3383	0.1319	0.0816	0.0940	0.0947	0.1800	0.1617

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 04, 94** **Time: 00:00** **Total Operation Time: 248 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17200	17200
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	89	76.7	63.8	50.8	38.1	33	29
Outlet Temp. (deg. C)	112	89	76.7	63.8	50.8	37.5	33
Temp. Rise (deg. C)	23	12.3	12.9	13	12.7	4.5	4
Flashing Temp. (deg. C)	123.5	94.7	84.3	72	58.8	42.8	36.8
Heat Transfer Rate (kj/S)	164.495	87.498	91.442	91.841	89.446	85.314	75.787
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	20.936	10.697	13.000	13.686	13.359	7.321	5.562
U (kW/sq.m/K)	1.682	4.223	3.631	3.464	3.457	2.352	2.749
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.3382	0.0853	0.0793	0.0926	0.0932	0.2292	0.1676

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 04, 94** **Time: 04:00** **Total Operation Time: 252 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17000	17000
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.965
Inlet Temp. (deg. C)	89	76.4	63.4	50.7	38.6	32.8	28.5
Outlet Temp. (deg. C)	112	89	76.4	63.4	50.7	37	32.8
Temp. Rise (deg. C)	23	12.6	13	12.7	12.1	4.2	4.3
Flashing Temp. (deg. C)	113.5	93.7	83.2	71.4	58.4	42.6	36.6
Heat Transfer Rate (kj/S)	164.495	89.628	92.142	89.716	85.224	78.697	80.520
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	8.234	9.669	12.164	13.359	12.812	7.505	5.681
U (kW/sq.m/K)	4.276	4.786	3.911	3.467	3.434	2.116	2.860
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	-0.0225	0.0574	0.0596	0.0923	0.0951	0.2765	0.1536

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 04, 94** **Time: 08:00** **Total Operation Time: 256 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	89	76.6	63.7	51	38.8	32.8	30
Outlet Temp. (deg. C)	112	89	76.6	63.7	51	38	32.8
Temp. Rise (deg. C)	23	12.4	12.9	12.7	12.2	5.2	2.8
Flashing Temp. (deg. C)	113	93.9	83.4	71.5	58.7	42.7	36.6
Heat Transfer Rate (kJ/S)	164.495	88.208	91.440	89.723	85.934	98.014	52.746
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	7.237	9.830	12.128	13.143	12.849	6.980	5.072
U (kW/sq.m/K)	4.865	4.633	3.893	3.524	3.453	2.834	2.099
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	-0.0508	0.0643	0.0608	0.0877	0.0935	0.1568	0.2804

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 04, 94** **Time: 12:00** **Total Operation Time: 260 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.902	3.968	3.966
Inlet Temp. (deg. C)	89	76.7	64	51.5	39.4	33.1	30
Outlet Temp. (deg. C)	112	89	76.7	64	51.5	38	33.1
Temp. Rise (deg. C)	23	12.3	12.7	12.5	12.1	4.9	3.1
Flashing Temp. (deg. C)	114	94.6	84.1	72	59.2	43.2	37.2
Heat Transfer Rate (kJ/S)	164.495	87.498	90.027	88.319	85.240	92.362	58.398
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.106	10.585	12.710	13.284	12.812	7.381	5.505
U (kW/sq.m/K)	3.866	4.268	3.657	3.432	3.435	2.525	2.141
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0022	0.0828	0.0774	0.0953	0.0951	0.1999	0.2711

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 04, 94** **Time: 16:00** **Total Operation Time: 264 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kJ/kg/K)	3.961	3.939	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.5	76.3	63.6	51.1	39.1	33.1	29
Outlet Temp. (deg. C)	112	88.5	76.3	63.6	51.1	38	33.1
Temp. Rise (deg. C)	23.5	12.2	12.7	12.5	12	4.9	4.1
Flashing Temp. (deg. C)	114	93.9	82.9	71.3	58.8	43	37.2
Heat Transfer Rate (kJ/S)	168.058	86.775	90.017	88.310	84.529	92.362	77.231
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.232	10.326	11.836	12.961	12.774	7.173	5.915
U (kW/sq.m/K)	3.896	4.339	3.927	3.518	3.416	2.598	2.635
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0003	0.0790	0.0586	0.0882	0.0966	0.1888	0.1835

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 04, 94** **Time: 20:00** **Total Operation Time: 268 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kJ/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.5	76.6	63.6	51	38.8	32.8	29
Outlet Temp. (deg. C)	112	88.5	76.6	63.6	51	38	32.8
Temp. Rise (deg. C)	23.5	11.9	13	12.6	12.2	5.2	3.8
Flashing Temp. (deg. C)	114	93.5	82.8	71.6	58.5	42.7	36.8
Heat Transfer Rate (kJ/S)	168.058	84.645	92.147	89.015	85.934	98.014	71.578
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.232	9.771	11.501	13.321	12.633	6.980	5.690
U (kW/sq.m/K)	3.896	4.472	4.136	3.450	3.512	2.834	2.538
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0003	0.0721	0.0457	0.0938	0.0887	0.1568	0.1979

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 05, 94** **Time: 00:00** **Total Operation Time: 272 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kj/kg/K)	3.961	3.940	3.926	3.913	3.901	3.968	3.965
Inlet Temp. (deg. C)	89	76.6	63.7	50.9	38.6	32.7	28.5
Outlet Temp. (deg. C)	112	89	76.6	63.7	50.9	37.5	32.7
Temp. Rise (deg. C)	23	12.4	12.9	12.8	12.3	4.8	4.2
Flashing Temp. (deg. C)	114.5	93.8	82.9	71.5	58.4	42.5	36.6
Heat Transfer Rate (kj/S)	164.495	88.208	91.440	90.428	86.635	90.471	79.109
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.904	9.716	11.576	13.180	12.670	7.133	5.746
U (kW/sq.m/K)	3.555	4.687	4.078	3.542	3.530	2.559	2.778
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0249	0.0618	0.0491	0.0862	0.0872	0.1946	0.1639

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 05, 94** **Time: 04:00** **Total Operation Time: 276 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kj/kg/K)	3.961	3.939	3.926	3.913	3.901	3.968	3.965
Inlet Temp. (deg. C)	88.5	76.5	63.6	50.8	38.5	32.6	28.5
Outlet Temp. (deg. C)	112	88.5	76.5	63.6	50.8	37.5	32.6
Temp. Rise (deg. C)	23.5	12	12.9	12.8	12.3	4.9	4.1
Flashing Temp. (deg. C)	114.5	93.5	82.8	71.2	58.2	42.4	36.5
Heat Transfer Rate (kj/S)	168.058	85.355	91.437	90.426	86.633	92.355	77.225
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	10.035	9.806	11.576	12.964	12.562	7.069	5.707
U (kW/sq.m/K)	3.584	4.494	4.078	3.601	3.560	2.636	2.731
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0226	0.0710	0.0491	0.0816	0.0848	0.1832	0.1701

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 05, 94** **Time: 08:00** **Total Operation Time: 280 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18200	18200
Specific Heat (kJ/kg/K)	3.961	3.939	3.926	3.913	3.901	3.968	3.966
Inlet Temp. (deg. C)	88.5	76.3	63.6	51	38.7	32.8	29.5
Outlet Temp. (deg. C)	112	88.5	76.3	63.6	51	37.5	32.8
Temp. Rise (deg. C)	23.5	12.2	12.7	12.6	12.3	4.7	3.3
Flashing Temp. (deg. C)	114	92.2	82.3	71.2	58.1	42.6	36.8
Heat Transfer Rate (kJ/S)	168.058	86.775	90.017	89.015	86.637	94.285	66.161
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.232	8.368	11.172	12.890	12.237	7.196	5.486
U (kW/sq.m/K)	3.896	5.354	4.160	3.565	3.655	2.644	2.434
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0003	0.0353	0.0443	0.0844	0.0775	0.1821	0.2148

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 06, 94** **Time: 20:00** **Total Operation Time: 316 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kj/kg/K)	3.960	3.939	3.925	3.912	3.900	3.968	3.966
Inlet Temp. (deg. C)	88	76.2	63.3	50.4	37.7	32.7	29
Outlet Temp. (deg. C)	112	88	76.2	63.3	50.4	38	32.7
Temp. Rise (deg. C)	24	11.8	12.9	12.9	12.7	5.3	3.7
Flashing Temp. (deg. C)	117	93.6	83.2	71.6	58.3	42.4	36.1
Heat Transfer Rate (kJ/S)	171.620	83.923	91.430	91.125	89.438	99.899	69.694
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	13.653	10.408	12.347	13.756	13.251	6.704	5.025
U (kW/sq.m/K)	2.690	4.163	3.823	3.420	3.485	3.007	2.799
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1153	0.0887	0.0655	0.0963	0.0909	0.1365	0.1612

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 07, 94** **Time: 00:00** **Total Operation Time: 320 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17100	17100
Specific Heat (kj/kg/K)	3.960	3.939	3.925	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	88	76.2	63.3	50.3	37.7	32.7	28
Outlet Temp. (deg. C)	112	88	76.2	63.3	50.3	38	32.7
Temp. Rise (deg. C)	24	11.8	12.9	13	12.6	5.3	4.7
Flashing Temp. (deg. C)	117	93.8	83.2	71.4	58.1	42.4	36.1
Heat Transfer Rate (kj/S)	171.620	83.923	91.430	91.830	88.733	99.899	88.524
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	13.653	10.630	12.347	13.578	13.106	6.704	5.414
U (kW/sq.m/K)	2.690	4.076	3.823	3.491	3.495	3.007	3.299
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1153	0.0938	0.0655	0.0903	0.0900	0.1365	0.1070

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 5-2 **Date: November 07, 94** **Time: 04:00** **Total Operation Time: 324 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	17200	17200
Specific Heat (kj/kg/K)	3.960	3.939	3.925	3.912	3.900	3.968	3.965
Inlet Temp. (deg. C)	88	76.2	63.3	50.2	37.7	32.4	28
Outlet Temp. (deg. C)	112	88	76.2	63.3	50.2	38	32.4
Temp. Rise (deg. C)	24	11.8	12.9	13.1	12.5	5.6	4.4
Flashing Temp. (deg. C)	117.5	94.5	83.7	71.7	58.4	42.3	35.9
Heat Transfer Rate (kj/S)	171.620	83.923	91.430	92.535	88.028	106.168	83.356
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	14.289	11.400	12.892	13.939	13.499	6.715	5.405
U (kW/sq.m/K)	2.571	3.801	3.661	3.427	3.367	3.190	3.112
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1326	0.1116	0.0770	0.0957	0.1010	0.1174	0.1252

Appendix 5.3.3-7

Calculation of Overall Heat Transfer Coefficient(U) and Fouling Factor(f) in Run 8

OPERATION CONDITION
FOR
RUN 8

1. Operation Period	16th Nov. to 6th Dec.
2. Operation Time	472 h
3. Scale Control Method	PPN(M) Dosing
4. Operation Mode	Recirculation
5. Ball Cleaning	at FF in BH of 0.34-0.36m^2K/kW
6. Top Brine Temperature	112℃
7. Flow Rate	
-Make Up Seawater	2.42 m^3/h
-Recirculation	6.5 m^3/h
-Product Water	0.9 m^3/h
-Blow Brine	1.52 m^3/h
8. Chenical Consituents of Brine	
-pH at 25℃	8.52
-M-Alkalinity as $CaCO_3$	180 mg/L
-Chloride ion	33,100 mg/L
-Concentration factor as Cl^-	1.40
9. Dosing Rate of Chemicals	
-Scale Inhibior = PPN(M)	2 mg/L
-Acid = 98% H_2SO_4	--

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 16, 94** **Time: 20:00** **Total Operation Time: 8 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.962	3.940	3.925	3.911	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.8	76.1	62	48.2	35	30.2	26.5
Outlet Temp. (deg. C)	112	89.8	76.1	62	48.2	34.5	30.2
Temp. Rise (deg. C)	22.2	13.7	14.1	13.8	13.2	4.3	3.7
Flashing Temp. (deg. C)	114.5	91.3	80.8	67.6	54.1	39.1	33.4
Heat Transfer Rate (kJ/S)	158.794	97.460	99.916	97.440	92.908	87.646	75.374
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.692	5.916	10.171	11.107	11.237	6.515	4.815
U (kW/sq.m/K)	3.507	8.505	5.072	4.529	4.269	2.715	3.159
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0288	-0.0339	0.0011	0.0247	0.0382	0.1723	0.1205

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 17, 94** **Time: 00:00** **Total Operation Time: 12 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.962	3.940	3.925	3.911	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.9	76.1	62	48.1	34.8	30	26
Outlet Temp. (deg. C)	112	89.9	76.1	62	48.1	34	30
Temp. Rise (deg. C)	22.1	13.8	14.1	13.9	13.3	4	4
Flashing Temp. (deg. C)	114.5	91.5	80.9	67.7	54.1	38.9	33.3
Heat Transfer Rate (kJ/S)	158.081	98.173	99.916	98.145	93.609	81.527	81.481
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	9.666	6.094	10.288	11.254	11.384	6.702	5.038
U (kW/sq.m/K)	3.500	8.316	5.014	4.502	4.245	2.455	3.264
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0293	-0.0313	0.0034	0.0260	0.0395	0.2113	0.1103

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 17, 94** **Time: 04:00** **Total Operation Time: 16 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.962	3.940	3.925	3.911	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.8	76.2	62.1	48.1	35	29.9	26
Outlet Temp. (deg. C)	112	89.8	76.2	62.1	48.1	34	29.9
Temp. Rise (deg. C)	22.2	13.6	14.1	14	13.1	4.1	3.9
Flashing Temp. (deg. C)	114	92.3	80.8	67.6	54.3	38.9	33.3
Heat Transfer Rate (kJ/S)	158.794	96.750	99.919	98.852	92.203	83.565	79.444
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	8.904	7.302	10.054	11.061	11.536	6.744	5.104
U (kW/sq.m/K)	3.817	6.840	5.131	4.614	4.126	2.501	3.141
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0056	-0.0053	-0.0012	0.0207	0.0463	0.2038	0.1223

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 17, 94** **Time: 08:00** **Total Operation Time: 20 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.962	3.940	3.925	3.911	3.898	3.967	3.964
Inlet Temp. (deg. C)	89.8	76.2	62.2	48.3	35.1	30.2	27
Outlet Temp. (deg. C)	112	89.8	76.2	62.2	48.3	35	30.2
Temp. Rise (deg. C)	22.2	13.6	14	13.9	13.2	4.8	3.2
Flashing Temp. (deg. C)	115	91.7	80.9	67.7	54.4	39.1	33.4
Heat Transfer Rate (kj/S)	158.794	96.750	99.212	98.150	92.910	97.841	65.190
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	10.431	6.479	10.138	11.027	11.460	6.193	4.617
U (kW/sq.m/K)	3.258	7.709	5.052	4.595	4.185	3.188	2.849
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0505	-0.0218	0.0019	0.0215	0.0428	0.1176	0.1549

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 17, 94** **Time: 12:00** **Total Operation Time: 24 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.962	3.940	3.925	3.911	3.899	3.967	3.964
Inlet Temp. (deg. C)	89.8	76.2	62.2	48.5	35.6	30.4	27.5
Outlet Temp. (deg. C)	112	89.8	76.2	62.2	48.5	35	30.4
Temp. Rise (deg. C)	22.2	13.6	14	13.7	12.9	4.6	2.9
Flashing Temp. (deg. C)	115	91.6	80.7	67.6	54.5	39.4	33.8
Heat Transfer Rate (kJ/S)	158.794	96.750	99.212	96.740	90.806	93.766	59.082
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	10.431	6.336	9.903	10.845	11.243	6.428	4.702
U (kW/sq.m/K)	3.258	7.884	5.172	4.605	4.170	2.944	2.536
Clean-U Value (kW/sq.m/K	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0505	-0.0247	-0.0027	0.0211	0.0437	0.1436	0.1983

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 17, 94** **Time: 16:00** **Total Operation Time: 28 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.962	3.940	3.924	3.910	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.8	75.5	61.6	48	34.8	30.1	26
Outlet Temp. (deg. C)	112	89.8	75.5	61.6	48	33.5	30.1
Temp. Rise (deg. C)	22.2	14.3	13.9	13.6	13.2	3.4	4.1
Flashing Temp. (deg. C)	115.5	91.6	80.7	67.6	54.3	39.1	33.4
Heat Transfer Rate (kJ/S)	158.794	101.719	98.486	96.021	92.904	69.296	83.519
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.135	6.527	10.684	11.489	11.683	7.166	5.077
U (kW/sq.m/K)	3.052	8.046	4.759	4.315	4.105	1.951	3.320
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0712	-0.0272	0.0140	0.0357	0.0475	0.3164	0.1052

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 17, 94** **Time: 20:00** **Total Operation Time: 32 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.961	3.939	3.924	3.910	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.5	75.5	61.5	47.7	34.4	29.6	25.5
Outlet Temp. (deg. C)	112	89.5	75.5	61.5	47.7	33	29.6
Temp. Rise (deg. C)	22.5	14	14	13.8	13.3	3.4	4.1
Flashing Temp. (deg. C)	115.8	92.2	81.2	67.7	54.2	38.8	33
Heat Transfer Rate (kj/S)	160.932	99.581	99.193	97.428	93.600	69.291	83.513
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.631	7.683	11.289	11.783	11.940	7.370	5.182
U (kW/sq.m/K)	2.962	6.691	4.536	4.269	4.047	1.897	3.252
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0813	-0.0021	0.0244	0.0382	0.0510	0.3310	0.1114

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 18, 94** **Time: 00:00** **Total Operation Time: 36 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.939	3.924	3.910	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.5	75.5	61.5	47.6	34.4	29.4	25.5
Outlet Temp. (deg. C)	112	89.5	75.5	61.5	47.6	33	29.4
Temp. Rise (deg. C)	22.5	14	14	13.9	13.2	3.6	3.9
Flashing Temp. (deg. C)	116	92.5	81.3	67.8	54.1	38.7	32.8
Heat Transfer Rate (kJ/S)	160.932	99.581	99.193	98.133	92.895	73.366	79.438
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.899	8.071	11.402	11.930	11.905	7.354	5.104
U (kW/sq.m/K)	2.895	6.370	4.491	4.247	4.029	2.013	3.141
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0891	0.0055	0.0266	0.0394	0.0521	0.3006	0.1223

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 18, 94** **Time: 04:00** **Total Operation Time: 40 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.939	3.924	3.910	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.5	75.4	61.3	47.4	34.2	29.2	25.5
Outlet Temp. (deg. C)	112	89.5	75.4	61.3	47.4	33	29.2
Temp. Rise (deg. C)	22.5	14.1	14.1	13.9	13.2	3.8	3.7
Flashing Temp. (deg. C)	116	92.3	81.2	67.7	54	38.5	32.7
Heat Transfer Rate (kJ/S)	160.932	100.291	99.897	98.128	92.891	77.441	75.363
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.899	7.843	11.437	12.042	12.015	7.234	5.129
U (kW/sq.m/K)	2.895	6.601	4.509	4.207	3.991	2.160	2.965
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0891	-0.0000	0.0257	0.0416	0.0545	0.2669	0.1412

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 18, 94** **Time: 08:00** **Total Operation Time: 44 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.961	3.940	3.924	3.910	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.5	75.9	61.7	47.7	34.4	29	26
Outlet Temp. (deg. C)	112	89.5	75.9	61.7	47.7	33.5	29
Temp. Rise (deg. C)	22.5	13.6	14.2	14	13.3	4.5	3
Flashing Temp. (deg. C)	116	92.2	81.4	68	54.2	38.6	32.4
Heat Transfer Rate (kj/S)	160.932	96.741	100.618	98.842	93.600	91.708	61.107
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.899	7.564	11.130	11.965	11.940	7.114	4.743
U (kW/sq.m/K)	2.895	6.603	4.667	4.265	4.047	2.601	2.600
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0891	-0.0001	0.0182	0.0384	0.0510	0.1884	0.1886

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 18, 94** **Time: 12:00** **Total Operation Time: 48 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.940	3.924	3.910	3.898	3.966	3.964
Inlet Temp. (deg. C)	89.5	75.8	61.5	47.8	34.5	29.2	25.5
Outlet Temp. (deg. C)	112	89.5	75.8	61.5	47.8	33	29.2
Temp. Rise (deg. C)	22.5	13.7	14.3	13.7	13.3	3.8	3.7
Flashing Temp. (deg. C)	116.5	92.6	81.4	68	54.3	38.7	32.7
Heat Transfer Rate (kJ/S)	160.932	97.451	101.323	96.723	93.602	77.441	75.363
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	12.557	8.107	11.278	12.082	11.940	7.439	5.129
U (kW/sq.m/K)	2.743	6.206	4.638	4.133	4.047	2.101	2.965
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1082	0.0096	0.0195	0.0459	0.0510	0.2800	0.1412

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 18, 94** **Time: 16:00** **Total Operation Time: 52 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.962	3.940	3.924	3.910	3.897	3.965	3.963
Inlet Temp. (deg. C)	89.8	75.5	61.2	47.3	34	28.8	25
Outlet Temp. (deg. C)	112	89.8	75.5	61.2	47.3	32.5	28.8
Temp. Rise (deg. C)	22.2	14.3	14.3	13.9	13.3	3.7	3.8
Flashing Temp. (deg. C)	116.5	92.5	81.2	67.6	54	38.4	32.3
Heat Transfer Rate (kJ/S)	158.794	101.719	101.314	98.125	93.592	75.398	77.396
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	12.468	7.772	11.392	12.042	12.161	7.600	5.169
U (kW/sq.m/K)	2.726	6.757	4.591	4.207	3.973	2.002	3.021
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1104	-0.0035	0.0217	0.0416	0.0556	0.3035	0.1349

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 18, 94** **Time: 20:00** **Total Operation Time: 56 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		#1	*#2*	*#3*	*#4*	*#5*	*#6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kJ/kg/K)	3.961	3.939	3.924	3.910	3.897	3.965	3.963
Inlet Temp. (deg. C)	89.5	75.4	61	46.9	33.6	28.3	24
Outlet Temp. (deg. C)	112	89.5	75.4	61	46.9	32	28.3
Temp. Rise (deg. C)	22.5	14.1	14.4	14.1	13.3	3.7	4.3
Flashing Temp. (deg. C)	116	92.8	81.1	67.4	53.6	37.9	31.7
Heat Transfer Rate (kJ/S)	160.932	100.291	102.019	99.530	93.584	75.393	87.570
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	11.899	8.481	11.426	12.112	12.161	7.600	5.260
U (kW/sq.m/K)	2.895	6.105	4.609	4.242	3.973	2.002	3.359
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.0891	0.0123	0.0209	0.0396	0.0556	0.3035	0.1016

CALCULATIONS OF OVERALL HEAT TRANSFER COEFFICIENT AND FOULING FACTOR

Run No. 8 **Date: November 19, 94** **Time: 00:00** **Total Operation Time: 60 hr.**

Variables	*Brine Heater*	*Evaporator Stages*					
		# 1	*# 2*	*# 3*	*# 4*	*# 5*	*# 6*
Flowrate (kg/h)	6500	6500	6500	6500	6500	18500	18500
Specific Heat (kj/kg/K)	3.961	3.939	3.924	3.910	3.897	3.965	3.963
Inlet Temp. (deg. C)	89	75.4	61	46.9	33.6	28.2	24
Outlet Temp. (deg. C)	112	89	75.4	61	46.9	32.5	28.2
Temp. Rise (deg. C)	23	13.6	14.4	14.1	13.3	4.3	4.2
Flashing Temp. (deg. C)	117	92	80.8	67.1	53.5	37.7	31.7
Heat Transfer Rate (kJ/S)	164.495	96.727	102.019	99.530	93.584	87.621	85.533
Heat Transfer Area (Sq.m)	4.6723	1.937	1.937	1.937	1.937	4.9556	4.9556
L.M.T.D. (deg. K)	13.351	7.950	11.083	11.776	12.051	7.135	5.327
U (kW/sq.m/K)	2.637	6.282	4.752	4.364	4.009	2.478	3.240
Clean-U Value (kW/sq.m/K)	3.9	6.6	5.1	5.1	5.1	5.1	5.1
f (sq.m K/kW)	0.1228	0.0077	0.0144	0.0331	0.0534	0.2075	0.1125