COOLING WATER TREATMENT CALCULATIONS

IMPORTANT NOTE

							FILL	INPUT
						COLOURED	DO NOT FILL	calculations

1	CIR. RATE	M3/hr.	fill	10000		FILLING COLOUR CODE						
2	ΔT	deg.C		10								
3	COC COC-1			5 4								
4	LEAK	M3/hr.		1								
5	UP CTSYSTEM	M3	M3	2000	FILL DATA							
A	Evaporation Rate	M3/hr.			185.19	M3/Hour						
B	Make Up Rate	M3/hr.		CLICK ONCE	231.48	M3/Hour						
C	Blow Down	M3/hr.			46.30	M3/Hour						
E	Drift Loss	M3/hr.			10	M3/Hour						
F	WASTAGE PERHOUR				57.30	M3/Hour						
G	Wastage/Day	m3/d			1375.11	M3/Day						
H	MAKE UP / DAY- M3/D		5556		166667	M3/MONTH						
	Wastage/Month	m3/m			41253	M3/Month						

	ANTISCALANT/ANTICORROSIVE DOSES				treatment on wastage		ANTI CORROSIVE SPECIAL					
6	ANTISCALANT/ANTICORROSIVE.	ppm	30	FILL DATA			ppm	25	icorrosive special			
	15ppm to50ppm			CLICK ONCE	41	LITERS/DAY		CLICK ONCE	di anodic/di cathodic 34	LITERS/D		
					1237.6	LITERS/MONTH			1031	LITERS/M		
					14851.2	LITERS/YEAR			12376	LITERS/YR		
7	RATE	RS./usd/LIT	110				RS./usd/LIT	100				
					136136	RS/USD/M			103133	RS/USD/M		
				CLICK ONCE	1633632	RS/USD/YR		CLICK ONCE	1237600	RS/USD/YR		
					tretment on wastage		HOMO/CO/TER POLYMER					
8	DISPERSANT	ppm	10	FILL DATA	POLYMER		ppm	5	CIAL STABILIZER			
	5ppm to 20 ppm			CLICK ONCE	14	LITERS/DAY		CLICK ONCE	7	LITERS/D		
					413	LITERS/MONTH			206	LITERS/M		
					4950.4	LITERS/YEAR			2475.2	LITERS/YR		
9	RATE	RS./usd/LIT	120	FILL RATE			RS./usd/LIT	150	FILL RATE			
				CLICK ONCE	49504	RS/USD/M		CLICK ONCE	30940	RS/USD/M		
					594048	RS/USD/YR			371280	RS/USD/YR		
5	HOLD UP CSTSYSTEM	M3	2000				M3	2000				
					treatment on hold up		REDUCING BIOCIDE-2					
10	REDUCING BIOCIDE-1	ppm	30	FILL DATA			ppm	40	FILL DATA	ON HOLDUP		
	30ppm to 100 ppm			CLICK ONCE	60	LITERS/INSTANCE		CLICK ONCE	80	LITER/INST		
		instances/month					instances/month					
11			2					2				
					120	LITS/MONTH			160	LITS/M		
					1440	LITS/YR.			1920	LITS/YR.		
12	RATE	RS./usd/LIT	200	FILL RATE			RS./usd/LIT	250	FILL RATE			
					24000	RS/USD/M			40000	RS/USD/M		
				CLICK ONCE	288000	RS/USD/YR		CLICK ONCE	480000	RS/USD/YR		
5	HOLD UP CTSYSTEM	M3	2000				M3	2000				
					treatment on hold up		OXYDISING BIOCIDE ON HOLD UP					
13	BIO DISPERSANT		10	FILL DATA			30-50 ppm 3-5 ppm/0-2	10	NaOCl/NaOBr CL2/O3/CLO2			
	5 ppm to 30 ppm			CLICK ONCE	20	LITERS/INSTANCE		CLICK ONCE	20	LITERS/INST		
		instances/month					instances/month					
14			2	FILL DATA				4				
				CLICK ONCE	40	RS/USD/M		CLICK ONCE	80	LITS/M		
					480	LITS/YR.			960	LITS/YR.		
15	RATE	RS./usd/LIT	300	FILL RATE			RS./usd/LIT	300	FILL RATE			
					12000	RS/M			24000	RS/USD/M		
				CLICK ONCE	144000	RS/USD/YR		CLICK ONCE	288000	RS/USD/YR		
							ANY SPECIAL ADDITIVE					
	Make Up Rate	M3/hr.	231.48	treatment on make up			Make Up Rate		M3/hr.	231.48		
	OXYDISING BIOCIDE-2	ppm	2				ppm	5				
16				0.46	LIT/HR				1.16	LIT/HR		
			24	HOURS	HOURS/DAY			24	HOURS	HOURS/D		
				11.1	LIT/DAY				27.8	LIT/DAY		
				CLICK ONCE				CLICK ONCE				
17				333	LITS/MONTH				833	LITS/M		
18												
				4000	LITS/YR.				10000	LITS/YR.		
19	RATE	RS./usd/LIT	70	FILL RATE			RS./usd/LIT	70	FILL RATE			
20				CLICK ONCE	23333	RS/USD/MONTH		CLICK ONCE	58333	RS/USD/M		
					280000	RS/USD/YR			700000	RS/USD/YR		

		TREATMENT COSTS		
21		MONTHLY	COSTS	.YEARLY
22		RS/USD		RS/USD
	ANTISCALANT/ANTICOR.	136136		1633632
	ANTICORROSIVE SPECIAL	103133		1237600
5	DISPERSANT POLYMER	49504		594048
	HOMO/CO/TER POLYMER	30940		371280
	REDUCING BIOCIDE-1	24000		288000
	REDUCING BIOCIDE-2	40000		480000
	BIODISPERSANT	12000		144000
	OXYDISING BIOCIDE	24000		288000
	OXYDISING BIOCIDE	23333		280000
	SPECIFIC ADDITIVE	58333		700000
			RS/USD	
	MONTHLY	501380		6016560

ONCE THROUGH SYSTEM
TREATMENT ON CIRCULATION RATE
ANTICORROSIVE FILMING AMINE BASED

CIR. RATE		3000	M3/HR.
	DOSE	1	PPM
	RATE	300	RS/USD/LIT
QUANTITY	PER DAY	72	LIT/DAY
	PER MON.	2160	LIT/M
	PER YEAR	25920	LIT/YR.
COST	PER YEAR	7776000	RS/USD

OXYDISING.BIOCIDE CHLORINE ETC

	DOSE	0.5	PPM
		6	HRS/DAY
	RATE	50	RS/KG
QUANTITY	PER MON.	270	KG/M
	PER YEAR	3240	KG/YR.
COST	PER YEAR	162000	RS/USD

by-S.C.Bharadwaj.

COOLING TOWCIRCULATION WATER			TREATMENT		SOFTWARE
Designed parameters					
Cir.rate	M3/hr	to fill	93	M3/hr	TO
			560		FILL
delta T	deg.C.	to fill	6	deg.C.	UP
					BLANKS
COC		to fill	2		HAVING
			1		COLOUR
COC-1			4		SHOWN
LEAK=0.1% OF CR.		0.1	0.093	M3/hr.	BELOW
Leak	%			0.1	
CST SYSTEM h	M3	to fill	90	M3	
Process	Calculation			24 hours run	
E=CRXDELTA T/560			M3/hr	M3/DAY	M3/month
Eva.Rate	M3/hr.		1.0	24	
M=E.x.COC/COC-1			M3/hr		
Make up	M3/hr.		2.0	48	
BD=M/COC			M3/hr		
Blow Down	M3/hr.		1.0	24	
DL=0.2% OF CR		0.2	100		
Drift loss		M3/hr.	0.186	4	
any LEAK		M3/hr	0.093		
total make up		M3/hr.	2.3	55	1636
Treatment	Based	On 340 days	per year	wastage	18538

PREPATED BY S. C. Bharadwaj

readsheet for the calculation of Ryzn

Input the data below:		
Parameter	**Value**	
Total Solids:	**610**	**ppm as total solids**
Temperature:	**45**	**oC**
Calcium Hardness:	**230**	**ppm as CaCO3**
Methyl Alkalinity:	**90**	**ppm as CaCO3**
pH	**6.0**	

Less tha

Greater t

Calculed Data:		
pHs	Saturation pH:	7.0
L	Langellier Index:	-1
R	Ryznar Index:	8

Calculation Details:

Langelier Index (L) = pH - pHs
where:
9.3 + A + B - C - D

		Value
A	Function of TOTAL SOLIDS	610
B	Function of TEMPERATURE	45
C	Function of CALCIUM HARDNESS	230
D	Function of ALKALINITY TO METHYL ORANGE	90
	pH	6.0
pHs	**Saturation pH:**	
L	**Langellier Index:**	
R	**Ryznar Index:**	

TDS Total Solids ppm	Factor A	Water Temperature °C	Factor B	Calcium Hardness ppm CaCO3
100	0.1	0	2.6	10
4000	0.2	2	2.5	12
		7	2.4	14
		10	2.3	18
		14	2.2	23
		18	2.1	29
		22	2.0	35
		28	1.9	44
		32	1.8	56
		38	1.7	70
		44	1.6	88
		51	1.5	111
		57	1.4	139
		64	1.3	175
		72	1.2	230
				280
				350
				440
				560
				700
				880

Treatment On	Wastage	18538	M3/per year	On wastage	18538	M3/year
Antiscalant	Wastage	55	M3/day	AntiCorrosive	Cathodic/	Di.Anodic
	to fill	55	M3/day	to fill	55	M3/day
ppm	30	1.6	lit/day	25	1.4	lit/day
Range-		49.1	lit/month	ppm	40.9	lit/month
20 to 60 ppm		556.2	lit/year	Rate.Rs.	463.5	lit/year
Rate .RS.	110	per lit.		100	Range-	30 to 80 ppm
	monthly Rs.	5398	/month	monthly Rs.	4089	/month
	yearly Rs.	61177	/year	yearly Rs.	46346	/year
Treatment On	continuous	basis	M3/day	Treatment on	continuous	basis
BASED ON	Hold up	90	M3	Hold up	90	M3

BIOCIDE	NON OXY.	Biocide-1	90	NON OXY.	Biocide-2	
ppm	30	21.6	lit/day	to fill	90	M3
Instances	8	172.8	lit/month	40	3.6	lit/day
Range-15 to20	ppm	2073.6	lit/year	8	28.8	lit/month
Rate Rs.	300	per lit.		Range-15-100	345.6	lit/year
	monthly Rs.	51840	/month	250	Rate.Rs./lit	
	yearly Rs.	622080	/year	monthly Rs.	7200	
				yearly Rs.	86400	

Treatment	BASED ON	MAKE UP			SPECIAL	additive
BIOCIDE	OXYDISING	Biocide	MAKE UP		Cl2/NaOCl/	ON HOLD UP
	Cl2/NaOCl	48	M3/day	MAKE UP	to fill	90
		to fill	0.717	lit/day	ppm	water
ppm	ppm	15	22	lit/month	10	90
Instances	continuous		258	lit/year	Instances	0.9
Range-1 to 5	ppm		3099		16	14.4
Rate Rs.	IR/USD	70	per lit.		Rate Rs.	172.8
Residual-			monthly Rs.	1506.6	70	MONTHLY.Rs.
0.3 to 0.5 ppm			yearly Rs.	17074.8	Range-5 to 10	yearly.Rs.

SEA WATER	ONCE	THROUGH	CONTINUOUS	basis	Special	CONTINUOUS
BIOCIDE	OXYDISING	ClO2/O3			Poly Amine	93
Treatment	to fill	93	Cir.rate	LITER	M3/Hr	0.186
Range-0.5 to	0.5	93	M3/hr.	0.0465	ppm	5.58
2 ppm		2232	M3/day	1.116	2	66.96
		66960	M3/month	33.48	continuous	Range-
Rate Rs.	70	803520	M3/year	401.76	Rate Rs.	100
	COST.Rs.	2343.6	monthly Rs.	2343.6		MONTHLY.Rs.
			yearly.Rs.	28123.2		yearly.Rs.

ALKALINITY		TOTAL			
pH	P	M	pH	P	M
7		3.5	9.7	180	1100
7.5		50	9.8	190	1150
7.8		100	9.9	200	1200
8		150	10	210	1250
8.3	5	200	10.1	220	1300
8.4	10	250	10.2	230	1350
8.5	20	300	10.3	240	1400
8.6	30	350	10.5	250	1500
8.7	40	400	10.6	300	1550
8.8	50	450	10.7	350	1600
9	60	500	108	400	1650
9	70	550	10.9	450	1700
9.1	80	600	11	500	1800
9.1	90	650			
9.2	100	700			
9.2	110	750			
9.3	120	800			
9.3	130	850			
9.4	140	900			
9.4	150	950			
9.5	160	1000			
9.6	170	1050			

by S.C. BHARADWAJ

formula pipe dia mm. equql to 18.826 under root Flow 2 x (M3/hr) divided by

ar & Langellier Index

an 5.5 = scaling,

han 6.5 = corrosive

8

Parameters	Make up UG/Surface/	CTS water 01/02/03
pH		
Alkalinity		
P		
M		
TH		
Ca		
Mg		
Cl		
SO4		
NO2/NO3		
PO4		

Function
0.1
1.6
2
2
7.0
-1
8

Negative = corrosive
Positive = scaling

SiO2
Fe
Cu
TDS
Sp.Cond.

TBC
SRB
E.Colie
Yeast/Funji
Algae
corrosion rate
LSI/RSI.

Factor C	Methyl Orange Alkalinity ppm CaCO3	Factor D
0.6	10	1.0
0.7	12	1.1
0.8	14	1.2
0.9	18	1.3
1	22	1.4
1.1	29	1.5
1.2	36	1.6
1.3	45	1.8
1.4	56	1.8
1.5	70	1.9
1.6	88	2.0
1.7	111	2.1
1.8	140	2.2
1.9	177	2.3
2.0	230	2.4
2.1	280	2.5
2.2	360	2.6
2.3	450	2.7
2.4	560	2.8
2.5	700	2.9
2.6	880	3.0

Conversion Factors			
Kg/CM2	1	Pounds/Inch2	
Kg/CM2	10	MN/m2	
kW/hr	1	1.36hp hr.	
Watt	1	1.36/1000 hp	
HP hr.	1	736 Watt	
Watt	1	0.86 kilocal/hr	
mg/lit	1	1 ppm	
ppm	1	1000 ppb	
% persant	1	10000 ppm	
ntu/lit	1	1 ppm	
ppb/lit	1	1000ppt	
TR	100	67.2M3/hr	
brine circula-		0.5 to 1.0 mtr/	
tion in CCC.		second	
Brine density		1.3 to1.6	
brine flow		400 to 500	

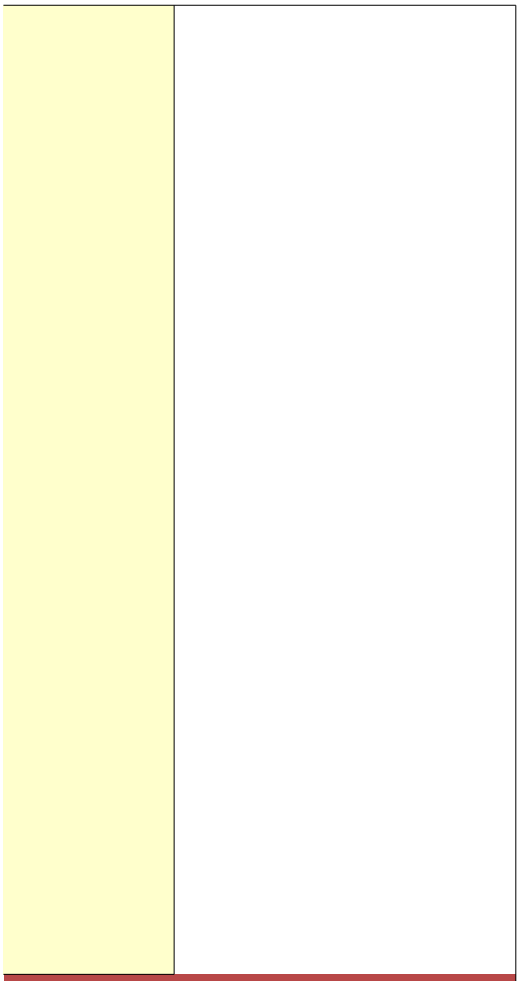
Anti	Corrosive	On wastage	18538	On wastage	18538	M3/year	
DISPERSANT	Dispersant	Mono Polyme	Monomer	DISPERSANT	POLYMER	CoPolymer	
On Hold up	55 M3/day			On Hold up		18538	
	to fill				to fill	18538	
ppm	10	0.5	lit/day	ppm	5	92.7	
Range-		16	lit/month	Range-	ppm	2780.8	
10 to 20 ppm		185	lit/year	10 to 15 ppm	Rate Rs.	31515	
Rate.Rs.	120	per lit.		Rate.Rs.	120		
Treatment on	monthly Rs.	1963	/month	Treatment on	monthly Rs.	333690	
continuous	yearly Rs.	22246	/year	continuous	yearly Rs.	3781824	
Hold up	90 M3						

prepared by S. C.

BIODISPERSANT		Cationic	Anionic
Bio Dispersant	90	M3	Non Ionic
ppm	10	0.9	lit/day
Instances	8	7	lit/month
Range-5 to 20	ppm	86	lit/year
Rate Rs.	300	per lit.	
	monthly Rs.	2160	
	yearly Rs.	25920	

Treatment	on	Shock	Basis	
BASIS	Oxydising	Biocide	ON SHOCK	ON HOLD UP
M3	/TTCA/	NaOBr/	ClO2/O3	Residual
OXY.BIOCIDE	M3	90	M3	ON HOLD UP
M3	ppm	10	0.9	lit/day
lit/day	Instance	4	3.6	lit/month
lit/month		to fill	43.2	lit/year
lit/year	Rate Rs.	125	per lit	1 to 2 ppm
1008	Range-	MONTHLY.Rs.	450	/month
12096	10 to 15 ppm	yearly.Rs.	5400	/year

BASED ON	CONTINUOUS	basis		
Cir.rate	Filming	Amine	Range-	2 to 3 ppm
lit/day	to fill	Cir.rate		LITERS
lit/month	ppm	93	M3/Hr	
lits/year	5	2232	M3/day	4.464
3 to 5 ppm		66960	M3/month	133.92
	Rs.	803520	M3/year	1517.76
31	Rate Rs.	500	MONTHLY.Rs	66960
374	Cost in Rs.		yearly Rs.	758880
prepared by	s.c.	Bharadwaj.	dt.03.11.16	



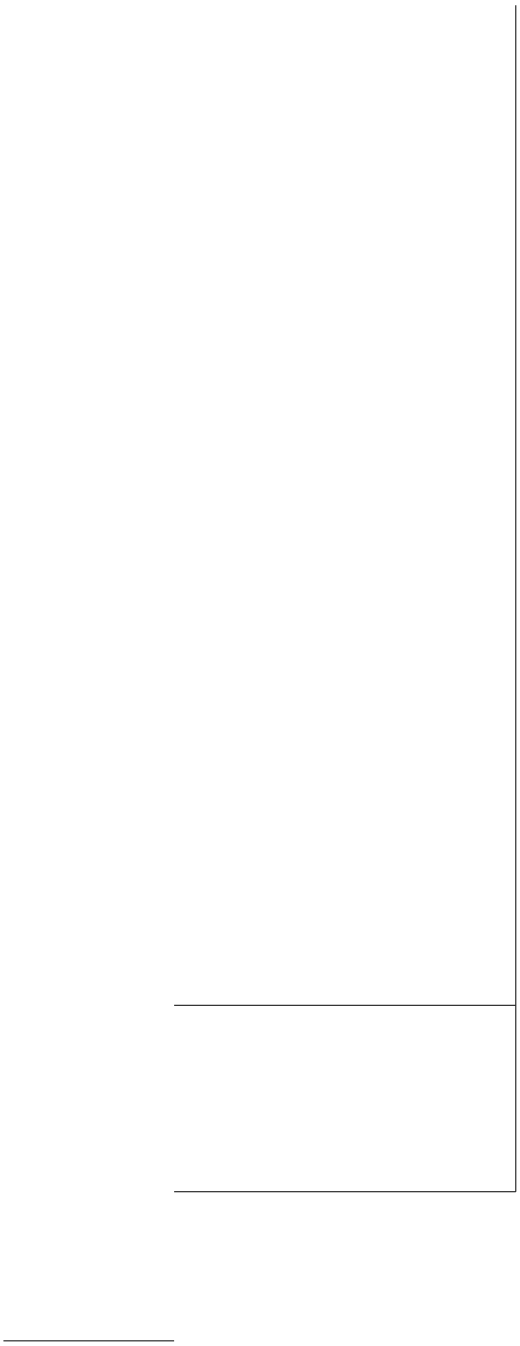
velocity
2 to3 mtrs/sec

CTS. Limit	CCC.(SRS)	CCC.Limits ambient/frez
CTS. Limit		09 to 10
8.5-9.0		80/100
500		500/600
300-500		<50
60% of TH		
40% of TH		
250		<0.5
300/750		250/350
NO3<10		500-800 NO2
01/05/20		01/05/20

150	100
0.5	0.5
0.2/0.5	0.2
1500/2500	1000/2000
1.5XTDS	1.5XTDS
100000/ml	100
100/100ml	1000
10/ml	nil
slight	nd.
slight	nd.
0.2/0.5	0.2/0.5
RSI-6.0-5.0	RSI-6.0-5.0

14.22psi	pressure
1	pressure
	energy
	power
	power
	Heat flow
parts per millic	quantity
parts per billio	1000 Ug/lit
parts per millic	per liter
parts per liter	per liter
parts per trialk	per liter
	flow
	velocity
	sp.gr.
M3/hr	flow
Bharadwaj	dt.18.11.2016

Terpolymer
M3/day
M3/day
lit/day
lit/month
lit/year
/month
/year



COOLING TOWCIRCULATION WATER			
Designed parameters			
Cir.rate	M3/hr	to fill	
delta T	deg.C.	to fill	
COC		to fill	
COC-1			
LEAK=0.1% OF CR.			0.1
Leak	M3/hr.		
CST SYSTEM h	M3	to fill	
Process	Calculation		
E=CRXDELTA T/560			
Eva.Rate	M3/hr.		
M=E.x.COC/COC-1			
Make up	M3/hr.		
BD=M/COC			
Blow Down	M3/hr.		
DL=0.2% OF CR			0.2
Drift loss	M3/hr.		
W=BD+DL+LEAK			

TREATMENT		SOFTWARE
		FINAL Treatme
10000	M3/hr	
560		AntiScalant
5	deg.C.	AntiCorrosive
		Dispersant
5		Red.Biocides
1		Red.Biocides
4		Biodispersant
100	M3/hr.	Oxy.Biocide
10		Oxy.Biocide
2000	M3	Secific
		Grand Total

89.3		
	M3/DAY	M3/Month
111.6	02679	80357
22.3		
100		
20		
10		

Treatment

Oxydising

Treatment

SHEET	prepared	by-S.C.	Bharadwaj.
Cost	Calculated	in	IR/USD
Total	Cost	Monthly	Yearly
	IR/USD	5,397.93	61,176.57
		4,089.34	5,56,150.63
		1,962.88	22,246.03
	-1	#N/A	#N/A
	-2	7,200.00	86,400.00
		51,840.00	6,22,080.00
Shock		#N/A	#N/A
Continuous		monthly Rs.	yearly Rs.
Additive		0.00	to fill
IR/USD	#VALUE!	to fill	#N/A
IMP.	NOTES		
Colour		BLANKS	to fill
IGNORED	25 days	IN A YEAR	
against	Annual	Over Hall/	shut down
CONSIDERED		WORKING	PERIOD
Day	as 24	hours	
Month	as 30	days	

ClO2/O3
(eg.NaOCl)
lit/day
lit/month
lit/year
/month
/year

cts.ccc offer

mg/lit	or	basis	Cathodic/	
				M3
		Make up		
			00139	
Based	on			M3/day
Biocide	on shock			
Based	on			

Treatment	chosen
Range-5 to 20 ppm	
RATE	chosen
	Cost
Treatment	Based
Oxydising Bioc	Calculations
(e.g.Chlorine)	Cl2/NaOCL
Treatment	chosen
Range-0.5 to 2 ppm	
choose the range	
RATE	chosen
	Cost
Sea waterTrea	Through
Oxydising Bioc	Calculations
(e.g.Chlorine)	Cl2/NaOCL
Treatment	chosen
Range-0.5 to 2 ppm	
choose the range	
RATE	chosen
	Cost
NOTE	ppm to

	to fill	below	to fill		To fill		to fill	to fill
	.....steaming..	M3/hour		50		100	150	500
	.....steaming..	M3/day		1200		2400	3600	12000
	Boiler Blow	% of steaming		10		5	3	2
	Down (CBD)							
	CBD loss	M3/hr				0	0	0
	Make up	M3/day		120		120	108	10
	Condensate	M3/hr						
	Return in %	% of steaming	%		%		%	
	of steaming	To fill		80		50	30	10
		M3/hr						
	.....	M3/day		40		1200	1080	1200
	Need based	M3 /Day.....		5		4	3	1
	Blow Down	from lower						
	if any	ring header						
	Total Make up	M3/day						
	per day							
	Steaming rate	-(cond.return		1035		1076	2409	10789
	total	+CBD+NBD)						
	WASTAGE							
		kg/cm2	Upto 20		Upto 40		Upto 60	Upto 80
TREATMENT	BOILER	Blow Down						
BASED ON	BLOW DOWN	M3/day		120		120	108	10
phosphate		ppm						
phosphonate	Cost	Treatment	Based on		Boiler		Blow Downs	
dispersant	Phosphate	based limit	Na3PO4		Na3PO4		Na3PO4	Na3PO4
	To fill	As PO4		30		20	12	6
As Product	Hint	Max.ppm		60		45	30	15
	Sulphite base	ppm	Na2SO3		Na2SO3		Na2SO3	Na2SO3
Na2SO3	To fill	As SO3		15		10	6	5
As Product	Hint	Max.ppm		48		32	16	8
Caustic Soda	Caustic based	ppm	NaOH		NaOH		NaOH	NaOH
Soda Ash	To fill	As CaCO3		5		4	3	2
As Product	Hint	Max.ppm		20		16	12	10
TREATMENT	Total Waste	Treatment	Based on		Total Wast		of water	
BASED ON	WASTAGE	M3/day		0		0	0	10
		based	N2H4		N2H4		N2H4	N2H4
Hydrazine	To fill	AsN2H4.2H2C		5		4	3	2
As Product	Hint	Max.ppm		24		20	16	8
		based	NH4OH		NH4OH		NH4OH	NH4OH
Ammonia	To fill	As NH4OH		2		2	1	1
As Product	Hint	Max.ppm		10		10	10	10
		C5H11NO	Morpholine		Morpholine		Morpholine	Morpholine
Morpholine	To fill	As Morpholine		3		3	4	4
As Product	Hint	Max.ppm		7.5		7.5	9	9
LIMITING	PARAMTRS	IN BOILER	RESIDUALS		TO BE		MAINTAINED AS TESTED	

pH			10 to11.5	10 to 11	10 to 10.5	9.5 to 10
ppm values	MF					
phosphate PO4		1.5	20-40	15-30	5 to 20	5 to 10
Sulphite SO3		1.6	15-30	10 to 20	5 to 10	3 to 8
Caustic (2P-M)=OH		2		10	8	6 5
Hydrazine		total		12	10	8 4
Hydrazine N2H4		2 residual	0.1-1.0	0.1-0.5	0.05-0.3	0.03 to 0.05
Ammonia NH3		2	5 to 10	5 to 8	5 to 6	4 to 5
Morpholine C5H11NO		1.5	3 to 5	3 to 5	5 to 6	3 to 6
			DT.25.11.16.	prepared by	S.C.	Bharadwaj

STEAMING

CBD

COND.RETRN

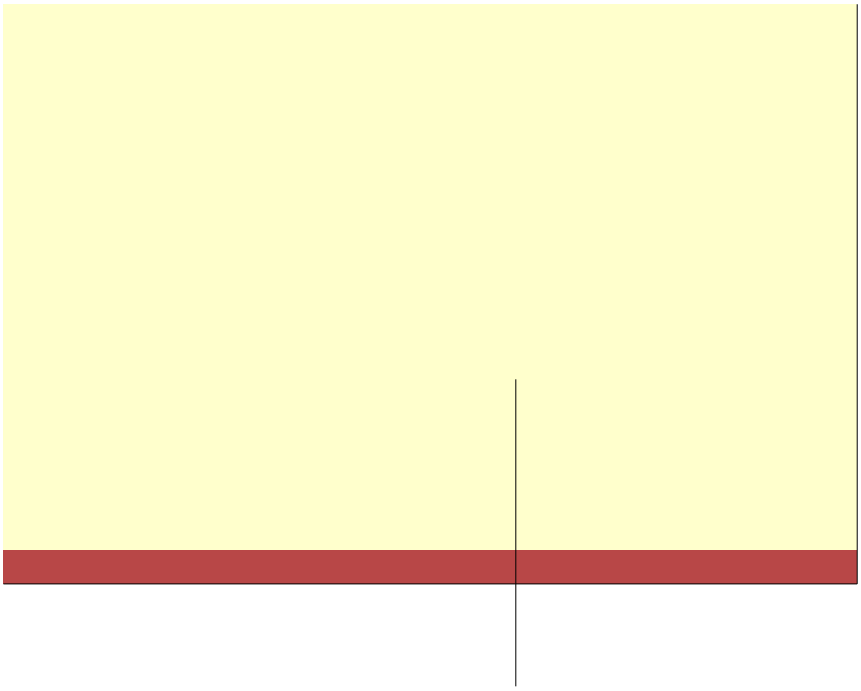
NBD/LBD

WASTAGE

Results

treatment	based on	boiler	CBD	blow down
20 kg/cm2	40kg/cm2	60kg/cm2	80kg/cm2	
3.6	2.4	1.296	0.06	daily basis
108	72	38.88	1.8	monthly basis
1224	816	440.64	20.4	yearly basis
1.8	1.2	0.648	0.05	daily basis
54	36	19.44	1.5	monthly basis
612	408	220.32	17	yearly basis
0.6	0.48	0.324	0.216	daily basis
18	14.4	9.72	6.48	monthly basis
204	163.2	110.16	73.44	yearly basis

treatment	based on	total	wastage	monthly basis
24.84	4.304	7.227	21.578	daily basis
745.2	129.12	129.12	647.34	monthly basis
8445.6	1463.36	2457.18	7336.52	yearly basis
2.07	2.152	2.409	10.789	daily basis
62.1	64.56	72.27	323.67	monthly basis
703.8	731.68	819.06	3668.26	yearly basis
3.105	3.228	9.636	43.156	daily basis
93.15	96.84	289.08	1294.68	monthly basis
1055.7	1097.52	3276.24	14673.04	yearly basis



COOLING TOWER	CIRCULATI	WATER	TREATMENT			SOFTWARE	SHEET
Designed parameters						FINAL Treatment	Cost
Cir.rate	M3/hr	to fill	41000	M3/hr			Total
			560			AntiScalant	
delta T	deg.C.	to fill	10	deg.C.		AntiCorrosive	
						Dispersant	
COC		to fill	4			Red.Biocides	-1
			1			Red.Biocides	-2
COC-1			3			Biodispersant	
LEAK=0.1% OF CR.		0.1	100	M3/hr.		Oxy.Biocide	Shock
Leak	M3/hr.		41			Oxy.Biocide	Continuou
CST SYSTEM hold up	M3	to fill	8000	M3		Secific	Additive
Process	Calculation					Grand Total	IR/USD
E=CRXDELTA T/560							IMP.
Eva.Rate	M3/hr.		732.1				
M=E.x.COC/COC-1				M3/DAY	M3/Month		Colour
Make up	M3/hr.		976.2	23429		702857	
BD=M/COC							IGNORED
Blow Down	M3/hr.		244.0				against
DL=0.2% OF CR		0.2	100				CONSIDER
Drift loss	M3/hr.		82				Day
W=BD+DL+LEAK			41				Month
Wastage	M3/hr.		367.0	08809			Year
Treatment	Based	on	Wastage	08809	M3/day		
Anti Scalant cum	Anti	Corrosive	Calculation				Anti
			to fill				Di
Treatment	chosen	ppm	30	264.3	lit/day		ppm
Range-15 to 50 ppm				7928.2	lit/month		
				89853.26	lit/year		
RATE	chosen	IR/USD	110	per lit.			IR/USD
	Cost	IR/USD		872105.1	/month		
		IR/USD		30550107	/year		
Treatment	Based	on	Wastage	08809	M3/day		
Dispersant	Polymer		Calculation				HomoPoly/
			to fill				
Treatment	chosen	ppm	10	88.1	lit/day		ppm
Range-5 to 20 ppm				2642.7	lit/month		
				29951.1	lit/year		
RATE	chosen	IR/USD	120	per lit.			IR/USD
	Cost	IR/USD		317129.1	/month		
		IR/USD		3594130	/year		
Treatment	Based	on	Hold up	10000	M3		
Reducing Biocide-1			Calculation				Reducing
			to fill				
Treatment	chosen	ppm	30	300	lit/day		ppm
Range-5 to 20 ppm		Instance	2	9000	lit/month		Instance
				108000	lit/year		
RATE	chosen	IR/USD	200	per lit.			IR/USD
	Cost	IR/USD		1800000	/month		
		IR/USD		21600000	/year		

Treatment	Based	on	Hold up	10000	M3	Oxydising
Bio Dispersant	Calculations		Cationic/	Anionic/	NonIonic	Cl2/NaOCl
			to fill			
Treatment	chosen	ppm	10	100	lit/day	ppm
Range-5 to 20 ppm		Instance	4	400	lit/month	Instance
				4800	lit/year	
RATE	chosen	IR/USD	300	per lit.		IR/USD
	Cost	IR/USD		120000	/month	
		IR/USD		1440000	/year	
Treatment	Based	on	Make up	23429	M3/day	Special
Oxydising Biocide	Calculations		on	continuous	basis	Cl2/NaOCl
(e.g.Chlorine)	Cl2/NaOCl	TTCA/	to fill	ClO2/O3		
Treatment	chosen	ppm	0.5	11.7	lit/day	ppm
Range-0.5 to 2 ppm		continuous		351.4	lit/month	continuous
choose the range				4217.1	lit/year	
RATE	chosen	IR/USD	70	per lit.		IR/USD
	Cost	IR/USD		24600	/month	
		IR/USD		295200	/year	
Sea waterTreat./Once	Through	Cir.Rate	based	41000	M3/hr	Special
Oxydising Biocide	Calculation	on Circulation		Rate	basis	Poly
(e.g.Chlorine)	Cl2/NaOCl	TTCA/	to fill	ClO2/O3		
Treatment	chosen	ppm	0.5	492	lit/day	ppm
Range-0.5 to 2 ppm		continuous		14760	lit/month	continuous
choose the range				177120	lit/year	
RATE	chosen	IR/USD	70	per lit.		IR/USD
	Cost	IR/USD		1033200	/month	
		IR/USD		12398400	/year	
NOTE	ppm to	mg/lit	or	gms/ton/n	or	kg/lit

prepared	by-S.C.	Bharadwaj.
Calculated	in	IR/USD
Cost	Monthly	Yearly
IR/USD	8,72,105.14	3,05,50,107.43
	0.00	0.00
	3,17,129.14	35,94,130.29
	18,00,000.00	2,16,00,000.00
	60,00,000.00	7,20,00,000.00
	1,20,000.00	14,40,000.00
	30,000.00	3,60,000.00
s	24,600.00	2,95,200.00
	2,46,000.00	29,52,000.00
###	###	###
NOTES		
	BLANKS	
		to fill
25 days	IN A YEAR	
Annual	Over Hall/	shut down
ED	WORKING	PERIOD
as 24	hours	
as 30	days	
as 340	days	
Corrosive	special	
Cathodic/	Di	Anodic
0	0.0	lit/day
	0.0	lit/month
	0	lit/year
0	per lit	
0.0	IR/USD	/month
0.0	IR/USD	/year
DiPoly/	Terpolymer	
to fill		
5	44.0	lit/day
	1321.4	lit/month
	14975.5	lit/year
120	per lit	
158564.6	IR/USD	/month
1797065.1	IR/USD	/year
Biocide-2		
to fill		
40	800	lit/day
2	24000	lit/month
	288000	lit/year
250	per lit.	
6000000	IR/USD	/month
72000000	IR/USD	/year

Biocide	on shock	basis
/TTCA/	NaOBr/	ClO2/O3
to fill		(e.g.ClO2)
2	4	lit/day
2	240	lit/month
	2880	lit/year
125	per lit	
30000	IR/USD	/month
360000	IR/USD	/year

additive	continuous	basis
/TTCA/	NaOBr/	ClO2/O3
to fill		(eg.NaOCl)
10	234.3	lit/day
s	7028.571429	lit/month
	84342.85714	lit/year
80	per lit.	
562285.7	IR/USD	/month
6747428.6	IR/USD	/year

additive	continuous	basis
Amine/	Filming	Amine
to fill	e.g.Filming	Amine
2	82	lit/day
s	2460	lit/month
	29520	lit/year
100	per lit.	
246000	IR/USD	/month
2952000	IR/USD	/year

1000	tons	/m3
prepared by	s.c.	Bharadwaj.

COOLING TOWER	CIRCULATI	WATER	TREATMENT			SOFTWARE	SHEET
Designed parameters						FINAL Treatment	Cost
Cir.rate	M3/hr	to fill	41000	M3/hr			Total
			560			AntiScalant	
delta T	deg.C.	to fill	10	deg.C.		AntiCorrosive	
						Dispersant	
COC		to fill	4			Red.Biocides	-1
			1			Red.Biocides	-2
COC-1			3			Biodispersant	
LEAK=0.1% OF CR.		0.1	100	M3/hr.		Oxy.Biocide	Shock
Leak	M3/hr.		41			Oxy.Biocide	Continuou
CST SYSTEM hold up	M3	to fill	8000	M3		Secific	Additive
Process	Calculation					Grand Total	IR/USD
E=CRXDELTA T/560							IMP.
Eva.Rate	M3/hr.		732.1				
M=E.x.COC/COC-1				M3/DAY	M3/Month		Colour
Make up	M3/hr.		976.2	23429		702857	
BD=M/COC							IGNORED
Blow Down	M3/hr.		244.0				against
DL=0.2% OF CR		0.2	100				CONSIDER
Drift loss	M3/hr.		82				Day
W=BD+DL+LEAK			41				Month
Wastage	M3/hr.		367.0	08809			Year
Treatment	Based	on	Wastage	08809	M3/day		
Anti Scalant cum	Anti	Corrosive	Calculation				Anti
			to fill				Di
Treatment	chosen	ppm	30	264.3	lit/day		ppm
Range-15 to 50 ppm				7928.2	lit/month		
				89853.26	lit/year		
RATE	chosen	IR/USD	110	per lit.			IR/USD
	Cost	IR/USD		872105.1	/month		
		IR/USD		30550107	/year		
Treatment	Based	on	Wastage	08809	M3/day		
Dispersant	Polymer		Calculation				HomoPoly/
			to fill				
Treatment	chosen	ppm	10	88.1	lit/day		ppm
Range-5 to 20 ppm				2642.7	lit/month		
				29951.1	lit/year		
RATE	chosen	IR/USD	120	per lit.			IR/USD
	Cost	IR/USD		317129.1	/month		
		IR/USD		3594130	/year		
Treatment	Based	on	Hold up	10000	M3		
Reducing Biocide-1			Calculation				Reducing
			to fill				
Treatment	chosen	ppm	30	300	lit/day		ppm
Range-5 to 20 ppm		Instance	2	9000	lit/month		Instance
				108000	lit/year		
RATE	chosen	IR/USD	200	per lit.			IR/USD
	Cost	IR/USD		1800000	/month		
		IR/USD		21600000	/year		

Treatment	Based	on	Hold up	10000	M3	Oxydising
Bio Dispersant	Calculations		Cationic/	Anionic/	NonIonic	Cl2/NaOCl
			to fill			
Treatment	chosen	ppm	10	100	lit/day	ppm
Range-5 to 20 ppm		Instance	4	400	lit/month	Instance
				4800	lit/year	
RATE	chosen	IR/USD	300	per lit.		IR/USD
	Cost	IR/USD		120000	/month	
		IR/USD		1440000	/year	
Treatment	Based	on	Make up	23429	M3/day	Special
Oxydising Biocide	Calculations		on	continuous	basis	Cl2/NaOCl
(e.g.Chlorine)	Cl2/NaOCl	TTCA/	to fill	ClO2/O3		
Treatment	chosen	ppm	0.5	11.7	lit/day	ppm
Range-0.5 to 2 ppm		continuous		351.4	lit/month	continuous
choose the range				4217.1	lit/year	
RATE	chosen	IR/USD	70	per lit.		IR/USD
	Cost	IR/USD		24600	/month	
		IR/USD		295200	/year	
Sea waterTreat./Once	Through	Cir.Rate	based	41000	M3/hr	Special
Oxydising Biocide	Calculation	on Circulation		Rate	basis	Poly
(e.g.Chlorine)	Cl2/NaOCl	TTCA/	to fill	ClO2/O3		
Treatment	chosen	ppm	0.5	492	lit/day	ppm
Range-0.5 to 2 ppm		continuous		14760	lit/month	continuous
choose the range				177120	lit/year	
RATE	chosen	IR/USD	70	per lit.		IR/USD
	Cost	IR/USD		1033200	/month	
		IR/USD		12398400	/year	
NOTE	ppm to	mg/lit	or	gms/ton/n	or	kg/lit

prepared	by-S.C.	Bharadwaj.
Calculated	in	IR/USD
Cost	Monthly	Yearly
IR/USD	8,72,105.14	3,05,50,107.43
	0.00	0.00
	3,17,129.14	35,94,130.29
	18,00,000.00	2,16,00,000.00
	60,00,000.00	7,20,00,000.00
	1,20,000.00	14,40,000.00
	30,000.00	3,60,000.00
s	24,600.00	2,95,200.00
	2,46,000.00	29,52,000.00
###	###	###
NOTES		
	BLANKS	
		to fill
25 days	IN A YEAR	
Annual	Over Hall/	shut down
ED	WORKING	PERIOD
as 24	hours	
as 30	days	
as 340	days	
Corrosive	special	
Cathodic/	Di	Anodic
0	0.0	lit/day
	0.0	lit/month
	0	lit/year
0	per lit	
0.0	IR/USD	/month
0.0	IR/USD	/year
DiPoly/	Terpolymer	
to fill		
5	44.0	lit/day
	1321.4	lit/month
	14975.5	lit/year
120	per lit	
158564.6	IR/USD	/month
1797065.1	IR/USD	/year
Biocide-2		
to fill		
40	800	lit/day
2	24000	lit/month
	288000	lit/year
250	per lit.	
6000000	IR/USD	/month
72000000	IR/USD	/year

Biocide	on shock	basis
/TTCA/	NaOBr/	ClO2/O3
to fill		(e.g.ClO2)
2	4	lit/day
2	240	lit/month
	2880	lit/year
125	per lit	
30000	IR/USD	/month
360000	IR/USD	/year

additive	continuous	basis
/TTCA/	NaOBr/	ClO2/O3
to fill		(eg.NaOCl)
10	234.3	lit/day
s	7028.571429	lit/month
	84342.85714	lit/year
80	per lit.	
562285.7	IR/USD	/month
6747428.6	IR/USD	/year

additive	continuous	basis
Amine/	Filming	Amine
to fill	e.g.Filming	Amine
2	82	lit/day
s	2460	lit/month
	29520	lit/year
100	per lit.	
246000	IR/USD	/month
2952000	IR/USD	/year

1000	tons	/m3
prepared by	s.c.	Bharadwaj.

COOLING TOWER SYSTEM MAKE UP AND WASTE WATER ` CALCULATION SOFTWARE

FEATURES-

[1] Software is made ready with the object to calculate instantly on per month basis the quantity of Make and Waste water. It is an stepping stone for Treatment cost calculations.
[2] To get them quickly certain physical operating parameters like Circulation rate,delta T,Cycle of Concentration(COC)and System hold up volume values are entered in the blanks
shown.
[3] Base data from per hour basis when filled, instantly per day and then per month consumption of Make and Waste water quantities are exhibited.
[3] So, there is no need to use calculator on daily basis.
[4] It can be made as a daily work sheet also. The SOFTWARE results shown, in the next steps can be utilized for the annual budget targeted vis a vis actual achievement in cost savings.
[5] There is one month guarantee for its normal functions and thereby a provision of free replacement. Finally,any modification subject to site conditions is a well come.
The software shall be amended accordingly and given back.
Let us then see, how much practical it shall be in meeting the target please.

With due regards.
S.C.Bharadwaj.Technical Advisor. GURGAON.
dt.23.01.2016. Haryana.(INDIA)

COOLING TOWER	CIRCULATION		WATER		TREATMENT
Designed parameters					
Cir.rate	M3/hr		to fill		4000
					560
delta T	deg.C.		to fill		5
COC			to fill		4
					1
COC-1					3
LEAK=0.1% OF CR.		100		0.1	4
Leak	M3/hr.				4
CST SYSTEM hold up	M3		to fill		1000
Process	Calculation				
E=CRXDELTA T/560					
Eva.Rate	M3/hr.				35.7
M=E.x.COC/COC-1					
Make up	M3/hr.				47.6
BD=M/COC					MAKE UP
Blow Down	M3/hr.				11.9
DL=0.2% OF CR				0.2	100
Drift loss	M3/hr.				8
W=BD+DL+LEAK					Wastage
Wastage	M3/hr.				23.9
Wastage	M3/year				Wastage
Hours of run per day		24	for yearly days		340
Days in a month		30			
PREPATED	BY		S.		C.

	SOFTWARE
M3/hr	TO FILL
deg.C.	UP BLANKS HAVING COLOUR SHOWN
M3/hr.	BELOW
M3	
make up M3/DAY	make up M3/Mon.
01143	34285.71
388571.42857143	PER YEAR
wastage M3/DAY	wastage M3/Mon.
00574	17211.43
195063	PER YEAR
	M3/year
Bharadwaj	tech.advr. 01/10/15