

**Water Services LTD**

www.arvanitakis.com www.power-chemicals.com www.refinery-chemicals.com www.paper-specialities.com

**16 TROADOS STR 15342 ATHENS GREECE**

tel +30 6948 518699 +30 210 6392937  
fax +30 210 6084605

e mails **dennis@arvanitakis.com**  
**export@power-chemicals.com**



**Dates**

Sampling	18/8/2004
Reporting	8/9/2004
Printout	09-Sep-2004

**Saukem-Porbandar**

**service report  
cooling water  
treatment**

29

working ...

Customer  
System

SAURASHTRA CHEMICALS  
Cooling Tower

Code  
IND388CT

POSITION  
129

**Athens 09/09/2004**

**To : SAURASHTRA CHEMICALS**  
**From : WATER SERVICES LTD**

**Attn : Mr. D.N. SHARMA**  
**cc : AQUAFILSEP LTD , PAARTH CONSULTANTS**

**Re : Corrosion and scale inhibition / Efficiency of cooling water system.**

Gentlemen,

Following our agreement for service, we have proceed the results of the chemical analysis of your system, sampled on 18/8/2004.

**We can consider the overall condition of the system as medium**

and in more detail :  
The system is presenting SCALE FORMING tendencies.  
SIGNIFICANT Deposition HAS ALREADY take place.  
Concentration rate (NC) is outside the system's design limits.(LIMIT :1.26-1.54, calculated value:2.33).

Finally, we have to confirm that our engineering staff is at your disposal at any time, for additional information, at +30 201 63 92 937, at fax no +30 210 60 84 605 or at e-mail [techn@power-chemicals.com](mailto:techn@power-chemicals.com)

Please, don't hesitate to contact us, if you need any further information

Truly yours  
**WATER SERVICES LTD**

**Dennis A. Arvanitakis**  
Chemical engineer

Please find attached the analysis and data processing report, plus a technical evaluation report covering a detailed presentation of our comments and remarks. We are proposing also to make the proposed corrective actions as soon as possible.

## Analysis Results

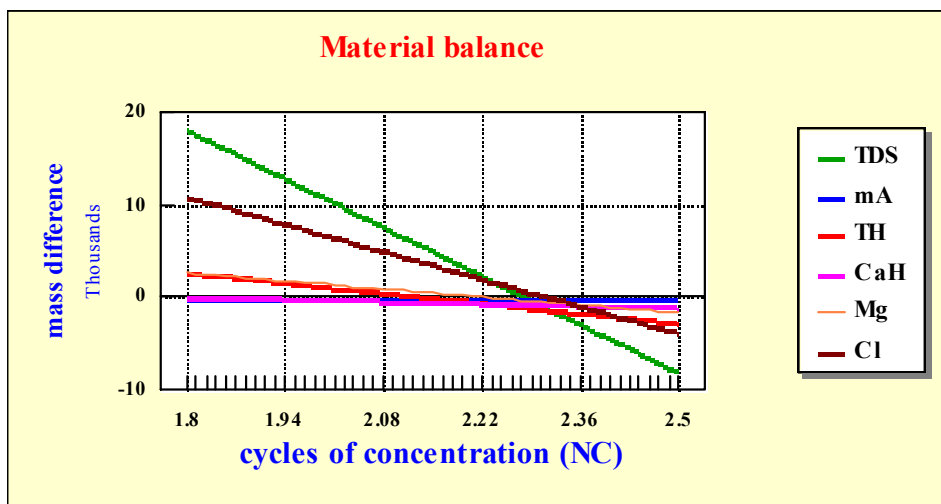
Parameter	Make-Up	Cooling Tower	COC	Material balance
pH	7.3	8.9		
TDS	37710	86082	2.28	1733
pA	0	80		-239
mA	242	325	1.34	-239
Cl	21165	49048	2.32	1397
TH	7900	17000	2.15	-767
CaH	1725	3250	1.88	680
MgH	6175	13700	2.22	
SO4	0	N/A	-	
SiO2	0	N/A	-	
Fe	0	N/A		

Selected Cycles of Concentration (COC) = **2.33**

Material balance: tot.summ = -1733 ppm Na2SO4

Substan	MU1	MU	calc	Syst	NC	dm
CaCO3	242	242	242	325	1.34	-239
MgCO3	0	0	0	0	0.00	0
NaCO3	0	0	0	0	0.00	0
CaSO4	1483	1483	1483	2925	1.97	-528
MgSO4	6175	6175	6175	13700	2.22	-680
NaSO4	0	0	0	50	0.0	50
CaCl	0	0	0	0	0.00	0
MgCl	0	0	0	0	0.00	-0
NaCl	29810	29810	29810	69082	2.32	-337
Mat.balance		o.k.		tot.summ		-1733

	actual	calculated
pHs	5.06	4.73
pH	8.90	8.90
RYZNAR	1.22	0.55
LANGELIER	3.84	4.17



## **Comments / suggestions**

### COOLING WATER TREATMENT SERVICE REPORT

Following our agreement for service, we have proceed the results of the chemical analysis of your system, sampled on 18/8/2004.

Based on the chemical analysis data you have e-mailed us, and after processing in our specialized data processing center, the current condition of your system can be characterized as:

System's condition can be considered as                      medium

Our special remarks are :

### **SCALE - CORROSION TENDENCIES**

The system is presenting SCALE FORMING tendencies. We came to this conclusion, by using the Ryznar and Langelier Indexes.

Unfortunately, from the processing of the analysis data we conclude that SIGNIFICANT Deposition HAS ALREADY take place."

Resulting from material balance.

We have to remind that efficiency drops by 4% for every 1 mm of scale, and this has serious effects in the plant's overall efficiency.

### **SYSTEM PROTECTION**

The protection achieved from the above tendencies, is according the material balance :

Concentration rate (NC) is outside the system's design limits. (LIMIT : 1.26-1.54, calculated value: 2.33).

The Total Dissolved Solids (TDS) value is from calculations

Analysis identifies crystal distortion activity of 767 ppm CaCO<sub>3</sub>

No sequestrant activities is observed from analysis examination.

Analysis identifies deposition probability of 630 ppm CaCO<sub>3</sub>

No scale dissolution is observed from analysis examination.

### **OTHER SUGGESTIONS**

Please adjust afterwards blow-down at 71 % of make-up water. instead of 42 % actual today, and that means increase 29 %

**Data for this calculation are the actual ones**

**#N/A**