

PLEASE HAND TO:	FAX NO:
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COMPANY:	PROJECT:
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## INFLUENT WATER ANALYSIS

### CATIONS

Constituent		ppm as CaCO <sub>3</sub>	Percent
Calcium	Ca		%
Magnesium	Mg		%
Sodium	Na		(Na + K)
Potassium	K		%

TOTAL CATIONS: *ppm*  
 Cation loading: *grains per gallon*

### ANIONS

Constituent		ppm as CaCO <sub>3</sub>	Percent
Bicarbonates	HCO <sub>3</sub>		(Total Alkalinity)
Carbonates	CO <sub>3</sub>		
Hydroxides	OH		
Carbon Dioxide	CO <sub>2</sub>		%
Chlorides	Cl		%
Sulfates	SO <sub>4</sub>		%
Silica	SiO <sub>2</sub>		%

TOTAL ANIONS: *ppm*  
 TOTAL anion loading: *grains per gallon*

The inlet water analysis shown above has been input to our resin rating software program to generate the performance data shown on the following pages. Specific parameters such as bed depths, engineering design factors, degasification, regenerant temperature and types, cocurrent or countercurrent regenerant flows, are all indicated in the heading description for each resin. Ratings are given from 4 to 20 lbs./cu.ft., up to 30 lbs /cu.ft. are calculated, (50 for softeners). Data for the full dosage range is kept on file and is available upon request.

ION EXCHANGE

RESIN PERFORMANCE PREDICTIONS

PREPARED FOR: Steve Titus

COMPANY: Chemtreat

PROJECT: Sun Oil Tulsa Refinery

30-Sep-2002

**CG8 DOWNFLOW REGENERATION WITH STEPWISE SULFURIC ACID**

0.90 = design factor                      50 Deg. F, water temperature  
 2.50 ft. bed depth                      2.00 - 5.00 gpm/ft<sup>3</sup>, flow                      Cations = 5.608 gr/gal

REGENERANT LBS./CU.FT. 93.3 % H <sub>2</sub> SO <sub>4</sub>	CAPACITY KGR./CU.FT. as CaCO <sub>3</sub>	SODIUM LEAKAGE, PPM as CaCO <sub>3</sub>	WASTE REGEN. KGR./CU.FT. as CaCO <sub>3</sub>	THROUGHPUT GAL./CU.FT.	REGEN-WASTE GR./GAL. as CaCO <sub>3</sub>
3	9.5	1.70	10.480	1723	6.083
4	11.5	1.18	15.085	2084	7.239
5	13.1	0.88	20.156	2363	8.530
6	14.4	0.69	25.526	2589	9.859
8	16.4	0.46	36.841	2941	12.526
10	17.9	0.34	48.637	3209	15.157
15	20.6	0.18	79.236	3684	21.511
20	22.5	0.11	110.655	4014	27.569

**SBG1P Regenerated Cocurrently at Ambient Temperature with NaOH. Run terminated at Silica = 500 ppb.**

0.90 = design factor                      50 Deg. F, water temperature                      1.00 ppm assumed Na leakage  
 2.50 ft. bed depth                      2.00 - 4.00 gpm/ft<sup>3</sup>, flow                      5.00 ppm CO<sub>2</sub> from Degas.                      Anions = 2.561 gr/gal

REGENERANT LBS./CU.FT. 100 % NaOH	CAPACITY KGR./CU.FT. as CaCO <sub>3</sub>	SILICA LEAKAGE, PPM as CaCO <sub>3</sub>	WASTE REGEN. KGR./CU.FT. as CaCO <sub>3</sub>	THROUGHPUT GAL./CU.FT.	REGEN-WASTE GR./GAL. as CaCO <sub>3</sub>
3	10.5	0.286	15.7	4100	3.84
4	11.8	0.082	23.2	4625	5.01
5	12.9	0.046	30.9	5027	6.14
6	13.7	0.033	38.8	5351	7.25
8	15.0	0.023	55.0	5857	9.39
10	16.0	0.019	71.5	6244	11.45
15	17.8	0.016	113.5	6934	16.37
20	19.0	0.015	156.0	7414	21.04

**WACMP DEALKALIZER REGENERATED WITH 66 DEG. Be' SULFURIC ACID, COCURRENT or COUNTERCURRENT**

0.90 = design factor                      50 Deg. F, water temperature  
 2.50 ft. bed depth                      2.00 gpm/ft<sup>3</sup>, flow                      Weak Acid Alkalinity load = 4.152 gr/gal

REGENERANT LBS./CU.FT. 93.3 % H <sub>2</sub> SO <sub>4</sub>	CAPACITY KGR./CU.FT. as CaCO <sub>3</sub>	SODIUM LEAKAGE, PPM as CaCO <sub>3</sub>	WASTE REGEN. KGR./CU.FT. as CaCO <sub>3</sub>	THROUGHPUT GAL./CU.FT.	REGEN-WASTE GR./GAL. as CaCO <sub>3</sub>	LBS/FT H <sub>2</sub> SO <sub>4</sub> TO OBTAIN MAX CAPCITY
3	20.0	NA		2954		STARVATION
4	26.6	NA		3939		STARVATION
5	33.3	NA		4924		STARVATION
6	39.9	NA		5908		STARVATION
8	48.6	NA	4.7	7189	0.65	7.666
10	48.6	NA	18.0	7189	2.50	7.666
15	48.6	NA	51.3	7189	7.13	7.666
20	48.6	NA	84.5	7189	11.76	7.666

ION EXCHANGE

RESIN PERFORMANCE PREDICTIONS

PREPARED FOR: Steve Titus

COMPANY: Chemtreat

PROJECT: Sun Oil Tulsa Refinery

30-Sep-2002

**WACMP DEALKALIZER REGENERATED WITH HYDROCHLORIC ACID, COCURRENT or COUNTERCURRENTLY**

0.90 = design factor

50 Deg. F, water temperature

2.50 ft. bed depth

2.00 gpm/ft<sup>3</sup>, flow

Weak Acid Alkalinity load = 4.152 gr/gal

REGENERANT LBS./CU.FT. 100 % HCl	CAPACITY KGR./CU.FT. as CaCO <sub>3</sub>	SODIUM LEAKAGE, PPM as CaCO <sub>3</sub>	WASTE REGEN. KGR./CU.FT. as CaCO <sub>3</sub>	THROUGHPUT GAL./CU.FT.	REGEN-WASTE GR./GAL. as CaCO <sub>3</sub>	LBS/FT HCl TO OBTAIN MAX CAPCITY
3	28.8	NA		4255		STARVATION
4	38.4	NA		5674		STARVATION
5	47.9	NA		7092		STARVATION
6	48.6	NA	8.9	7189	1.24	5.322
8	48.6	NA	28.1	7189	3.91	5.322
10	48.6	NA	47.3	7189	6.58	5.322
15	48.6	NA	95.2	7189	13.25	5.322
20	48.6	NA	143.2	7189	19.92	5.322