

ChemScan[®] Process Analyzer

Data Summary

Chloramination Monitoring and Control

East Bay MUD

Oakland, CA

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**SUMMARY OF CHEMSCAN ANALYZER TEST DATA AT EBMUD
(6/4/98-6/5/98)**

Free NH3-N Standard Tests (EBMUD STDS)

STD	CHEMSCAN	DIFFERENCE
0.05	0.043	0.007 mg/l
0.1	0.099	0.001 mg/l
0.15	0.154	0.004 mg/l
0.2	0.21	0.01 mg/l
0.4	0.413	0.013 mg/l
0.55	0.541	0.009 mg/l

Measured Minimum Detection Limit using 7 samples:
MDL = 0.0016 mg/l

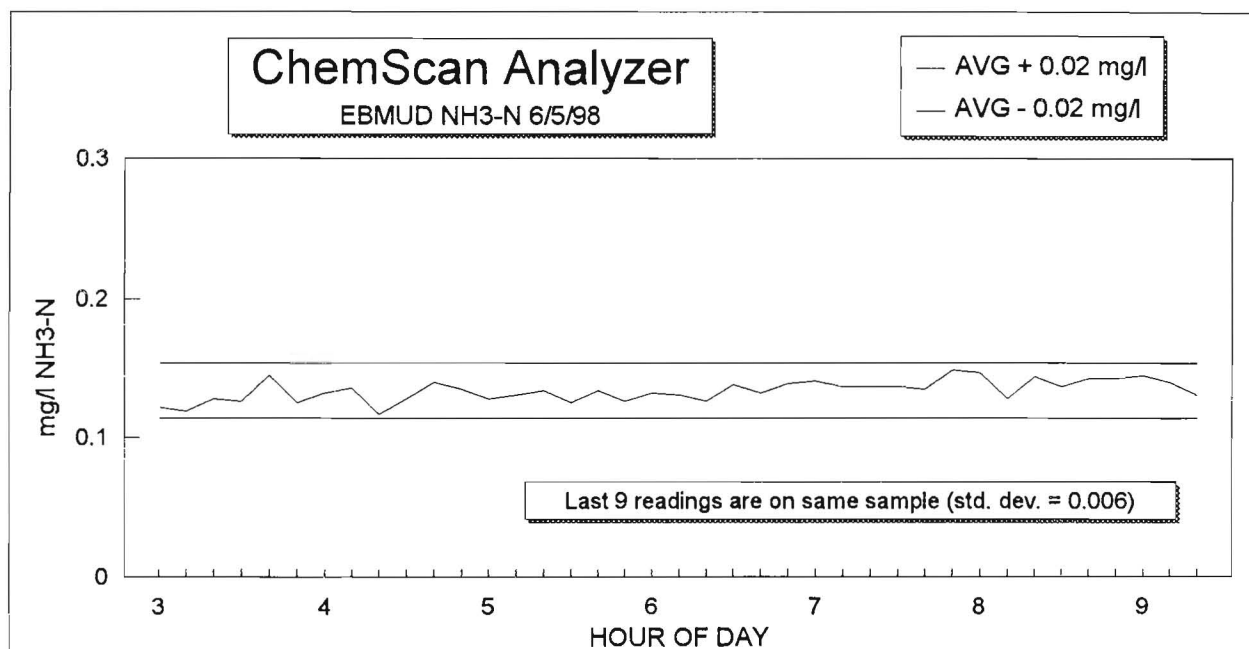
Repeatability Test

(Repeat readings on a 10 liter batch sample of EBMUD water)

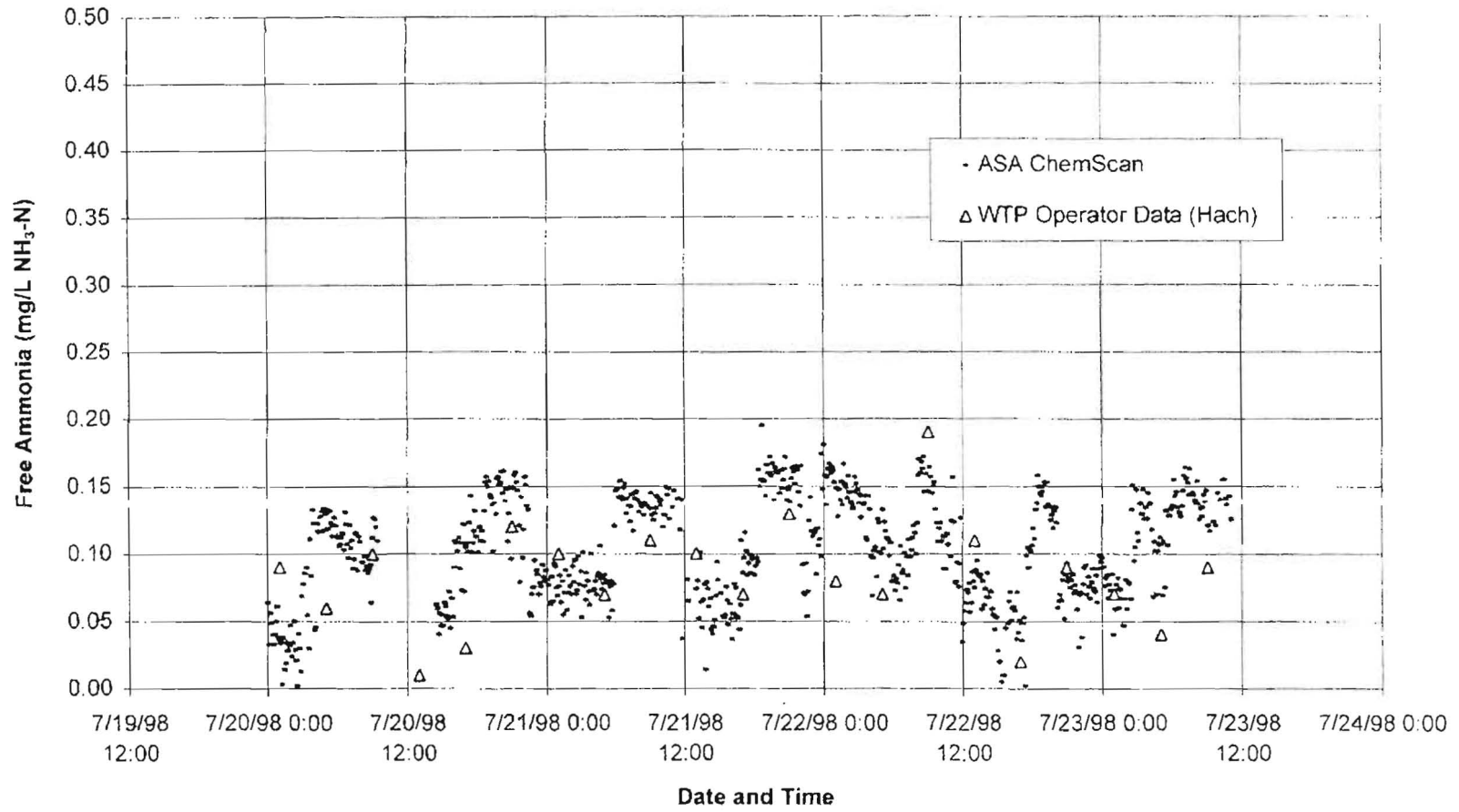
09:00 AM	0.147 mg/l	Standard Deviation 0.00616 mg/l
09:06 AM	0.128 mg/l	
09:12 AM	0.144 mg/l	
09:18 AM	0.137 mg/l	
09:24 AM	0.143 mg/l	
09:30 AM	0.143 mg/l	
09:36 AM	0.145 mg/l	
09:42 AM	0.14 mg/l	
09:48 AM	0.131 mg/l	

Mono Chloramine Background Test (DI H2O):

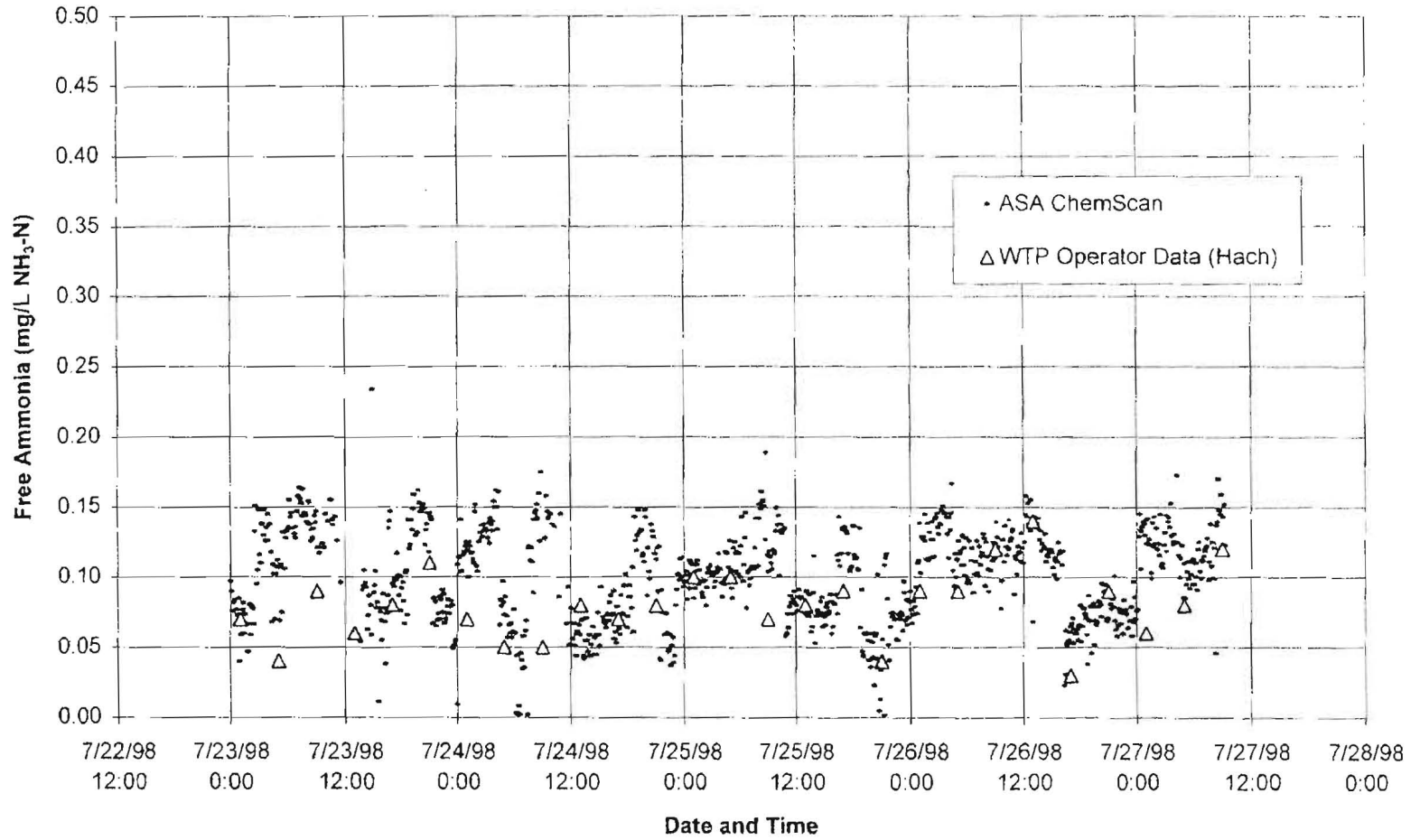
Measure Total CL2	1.74 mg/l
Added NH3-N	0.5 mg/l
Theoretical Free NH3-N	0.152 mg/l
Hach Measured Free NH3-N	0.16 mg/l
ChemScan Measured Free NH3-N	0.154 mg/l



ASA ChemScan Ammonia Analyzer
Results at USL South 30 CW Effluent
07/20/98 - 07/23/98



ASA ChemScan Ammonia Analyzer
Results at USL South 30 CW Effluent
07/23/98 - 07/27/98



ASA ChemScan Results at USL South 30 CW Effluent
07/20/98 - 07/24/98

Split Samples

Date/Time	Free Ammonia (mg/L NH ₃ -N)				
	Hach (field)	ISE (lab)	ASA ChemScan	Error	Abs Error
7/20/98 10:06	N/A	0.11	0.09	-0.02	0.02
7/20/98 10:45	N/A	0.12	0.11	-0.01	0.01
7/20/98 11:30	N/A	0.05	0.09	0.04	0.04
7/20/98 12:15	N/A	0.07	0.05	-0.02	0.02
7/20/98 13:00	N/A	0.07	0.07	0.00	0.00
Daily Average Absolute Error					0.02

Date/Time	Free Ammonia (mg/L NH ₃ -N)				
	Hach (field)	ISE (lab)	ASA ChemScan	Error	Abs Error
7/21/98 10:45	0.17	0.17	0.16	-0.01	0.01
7/21/98 11:15	0.14	0.15	0.14	-0.01	0.01
7/21/98 11:45	0.04	0.06	0.04	-0.02	0.02
7/21/98 12:20	0.10	0.09	0.09	0.00	0.00
7/21/98 12:50	0.08	0.08	0.08	0.00	0.00
Daily Average Absolute Error					0.01

Date/Time	Free Ammonia (mg/L NH ₃ -N)				
	Hach (field)	ISE (lab)	ASA ChemScan	Error	Abs Error
7/23/98 9:15	0.14	0.16	0.13	-0.03	0.03
7/23/98 9:45	0.13	0.13	0.13	0.00	0.00
7/23/98 10:15	0.16	0.16	0.14	-0.02	0.02
7/23/98 10:45	0.16	0.18	0.14	-0.04	0.04
7/23/98 11:15	0.12	0.13	0.11	-0.02	0.02
Daily Average Absolute Error					0.02

Date/Time	Free Ammonia (mg/L NH ₃ -N)				
	Hach (field)	ISE (lab)	ASA ChemScan	Error	Abs Error
7/24/98 8:30	0.19	0.16	0.16	-0.01	0.01
7/24/98 9:05	0.10	0.13	0.13	0.00	0.00
7/24/98 9:35	N/A	0.15	0.15	0.00	0.00
7/24/98 10:05	0.15	0.14	0.14	0.00	0.00
7/24/98 10:30	N/A	0.09	0.07	-0.02	0.02
Daily Average Absolute Error					0.01

Weekly Average Absolute Error (n = 20)

0.01

ASA ChemScan Results for Standards

Standards

Date: 07/20/98

Standard (mg/L NH3-N)	Free Ammonia (mg/L NH3-N)			
	ISE (lab)	ASA ChemScan	Error	Abs Error
0.02	0.02	<0.002 ^a	N/A	N/A
0.05	0.05	<0.002 ^a	N/A	N/A
0.10	0.10	0.11	0.01	0.01
0.30	0.32	0.32	0.00	0.00
0.50	0.52	0.54	0.02	0.02
Average Absolute Error				0.01

^a These standards were measured at refrigeration temperature. The 0.30 and 0.50 standards were measured at room temperature. The 0.10 standard was first measured at refrigeration temperature resulting in a ChemScan value of 0.05 mg/L NH3-N, but was measured a second time at room temperature resulting in a value of 0.11 mg/L NH3-N.

Date: 07/24/98

Standard (mg/L NH3-N)	Free Ammonia (mg/L NH3-N)			
	ISE (lab)	ASA ChemScan	Error	Abs Error
0.02	0.02	0.03	0.01	0.01
0.05	0.05	0.05	0.00	0.00
0.10	0.10	0.11	0.01	0.01
0.30	0.27	0.32	0.05	0.05
0.50	0.51	0.53	0.02	0.02
Average Absolute Error				0.02