ICR TREATMENT STUDY ANALYSIS

Base Analysis and Data Review Comments

Treatment Study ID 1068

Study Protocol GAC pilot-scale treatment study

Plant ICR Number 428

PWS Name Saint Paul Water Utility

City, State, Zip Saint Paul, MN 55101-1007

These are general comments that do not need to be responded to directly.

Major comments:

None.

General Comments:

1. Two pilot runs were performed, one in the fall and a second in the spring. Due to rapid breakthrough at an influent pH of 8.5, the first pilot run was restarted at a lower GAC influent pH (average GAC influent pH was 6.8). Two GACs were evaluated, both bituminous coal-based GACs. An 8x30 mesh size GAC was evaluated during the first study, while a 12x40 mesh sized GAC was evaluated during the second run. Although longer run times occurred during the second study, seasonal effects such as a decrease in average influent TOC concentration may have impacted GAC performance. The fall run utilized a 23°C SDS incubation temperature, while that used during the spring run averaged 10°C.

2. The SDS incubation time varied from 7 to 17 days during both studies.

Outlier Data:

Nine outliers removed.

Cell: A1
Comment: 1068-SAS.xls 2/17/00 15:13

All curve fits reviewed and approved. See below for log of refit datasets.

Cell: C9
Comment: 1068-10-01 - Run 1 (DBCM) 2/17/00 14:33
Original value (CoefA0) = -0.121 New value = 2.0604
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: D9
Comment: 1068-10-01 - Run 1 (DBCM) 2/17/00 14:33
Original value (CoefAf) = 1.2957 New value = 2.784
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: E9
Comment: 1068-10-01 - Run 1 (DBCM) 2/17/00 14:33
Original value (CoefB) = 1.0162 New value = 19.9165
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: F9
Comment: 1068-10-01 - Run 1 (DBCM) 2/17/00 14:33
Original value (CoefD) = 0.1493 New value = 0.2018
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: J9
Comment: 1068-10-01 - Run 1 (DBCM) 2/17/00 14:33
Original value (S) = 0 New value = -0.0165
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: C10
Comment: 1068-10-01 - Run 1 (DCAA) 2/17/00 14:34
Original value (CoefA0) = 0 New value = 6.573
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: D10
Comment: 1068-10-01 - Run 1 (DCAA) 2/17/00 14:34
Original value (CoefAf) = 50 New value = 43.0307
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: E10
Comment: 1068-10-01 - Run 1 (DCAA) 2/17/00 14:34
Original value (CoefB) = 10 New value = 979.0398
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: F10
Comment: 1068-10-01 - Run 1 (DCAA) 2/17/00 14:34
Original value (CoefD) = 0.15 New value = 0.7805
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: J10
Comment: 1068-10-01 - Run 1 (DCAA) 2/17/00 14:34
Original value (S) = 0 New value = -0.6843
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: C16
Comment: 1068-10-01 - Run 1 (MCAA) 2/17/00 14:36
Original value (CoefA0) = -2.9636 New value = -0.5732
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: D16
Comment: 1068-10-01 - Run 1 (MCAA) 2/17/00 14:36
Original value (CoefAf) = 11.55 New value = 5.7273
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: E16
Comment: 1068-10-01 - Run 1 (MCAA) 2/17/00 14:36
Original value (CoefB) = 3.1964 New value = 28.9758
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: F16
Comment: 1068-10-01 - Run 1 (MCAA) 2/17/00 14:36
Original value (CoefD) = 0.1151 New value = 0.4357
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: J16
Comment: 1068-10-01 - Run 1 (MCAA) 2/17/00 14:36
Original value (S) = -0.6939 New value = 0
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: C24
Comment: 1068-10-02 - Run 3 (BCAA) 2/17/00 14:41
Original value (CoefA0) = -2.95 New value = -0.736
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: D24
Comment: 1068-10-02 - Run 3 (BCAA) 2/17/00 14:41
Original value (CoefAf) = 8.85 New value = 4.9435
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: E24
Comment: 1068-10-02 - Run 3 (BCAA) 2/17/00 14:41
Original value (CoefB) = 1.8617 New value = 11.4927
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: F24
Comment: 1068-10-02 - Run 3 (BCAA) 2/17/00 14:41
Original value (CoefD) = 0.0412 New value = 0.145
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: J24

Comment: 1068-10-02 - Run 3 (BCAA) 2/17/00 14:41
Original value (S) = 0 New value = 0
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: C25
Comment: 1068-10-02 - Run 3 (BDCM) 2/17/00 14:46
Original value (CoefA0) = -10.2928 New value = -20.1112
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: D25
Comment: 1068-10-02 - Run 3 (BDCM) 2/17/00 14:46
Original value (CoefAf) = 31.5 New value = 58.1079
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: E25
Comment: 1068-10-02 - Run 3 (BDCM) 2/17/00 14:46
Original value (CoefB) = 1.8092 New value = 1.8848
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: F25
Comment: 1068-10-02 - Run 3 (BDCM) 2/17/00 14:46
Original value (CoefD) = 0.0298 New value = 0.0189
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: J25
Comment: 1068-10-02 - Run 3 (BDCM) 2/17/00 14:46
Original value (S) = 0 New value = -0.1538
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: C30
Comment: 1068-10-02 - Run 3 (DBAA) 2/17/00 14:50
Original value (CoefA0) = 0 New value = 0
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: D30
Comment: 1068-10-02 - Run 3 (DBAA) 2/17/00 14:50
Original value (CoefAf) = 0 New value = 1.7
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: E30
Comment: 1068-10-02 - Run 3 (DBAA) 2/17/00 14:50
Original value (CoefB) = 0 New value = 0
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: F30
Comment: 1068-10-02 - Run 3 (DBAA) 2/17/00 14:50
Original value (CoefD) = 0 New value = 0
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: J30
Comment: 1068-10-02 - Run 3 (DBAA) 2/17/00 14:51

Original value (S) = 0 New value = -0.0324
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: C31
Comment: 1068-10-02 - Run 3 (DBCM) 2/17/00 14:38
Original value (CoefA0) = 0.1251 New value = -1.0057
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: D31
Comment: 1068-10-02 - Run 3 (DBCM) 2/17/00 14:38
Original value (CoefAf) = 4.8276 New value = 13.9834
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: E31
Comment: 1068-10-02 - Run 3 (DBCM) 2/17/00 14:38
Original value (CoefB) = 12.6559 New value = 23.6455
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: F31
Comment: 1068-10-02 - Run 3 (DBCM) 2/17/00 14:38
Original value (CoefD) = 0.1705 New value = 0.138
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: J31
Comment: 1068-10-02 - Run 3 (DBCM) 2/17/00 14:38
Original value (S) = -0.0242 New value = -0.044
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: C33
Comment: 1068-10-02 - Run 3 (DCBAA) 2/17/00 14:43
Original value (CoefA0) = 0 New value = -0.1247
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: D33
Comment: 1068-10-02 - Run 3 (DCBAA) 2/17/00 14:43
Original value (CoefAf) = 3.7 New value = 2.3007
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: E33
Comment: 1068-10-02 - Run 3 (DCBAA) 2/17/00 14:43
Original value (CoefB) = 20 New value = 736.1219
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: F33
Comment: 1068-10-02 - Run 3 (DCBAA) 2/17/00 14:43
Original value (CoefD) = 0.15 New value = 0.448
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: J33
Comment: 1068-10-02 - Run 3 (DCBAA) 2/17/00 14:43
Original value (S) = 0 New value = 0

Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: C38
Comment: 1068-10-02 - Run 3 (MCAA) 2/17/00 14:47
Original value (CoefA0) = 0 New value = 0
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: D38
Comment: 1068-10-02 - Run 3 (MCAA) 2/17/00 14:47
Original value (CoefAf) = 0 New value = 3.7
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: E38
Comment: 1068-10-02 - Run 3 (MCAA) 2/17/00 14:47
Original value (CoefB) = 0 New value = 0
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: F38
Comment: 1068-10-02 - Run 3 (MCAA) 2/17/00 14:47
Original value (CoefD) = 0 New value = 0
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: J38
Comment: 1068-10-02 - Run 3 (MCAA) 2/17/00 14:47
Original value (S) = 0 New value = -0.2324
Fewer than 6 points above MRL. Peak curve/step function combination applied.

Cell: C40
Comment: 1068-10-02 - Run 3 (TCAA) 2/17/00 14:48
Original value (CoefA0) = -0.2429 New value = -0.4034
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: D40
Comment: 1068-10-02 - Run 3 (TCAA) 2/17/00 14:48
Original value (CoefAf) = 24 New value = 10.5503
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: E40
Comment: 1068-10-02 - Run 3 (TCAA) 2/17/00 14:48
Original value (CoefB) = 36.668 New value = 21.2713
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: F40
Comment: 1068-10-02 - Run 3 (TCAA) 2/17/00 14:48
Original value (CoefD) = 0.0558 New value = 0.083
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: J40
Comment: 1068-10-02 - Run 3 (TCAA) 2/17/00 14:48
Original value (S) = 0 New value = 0
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

Cell: C43
Comment: 1068-10-02 - Run 3 (TOX) 2/17/00 14:52
Original value (CoefA0) = -1.6373 New value = 32.8374
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: D43
Comment: 1068-10-02 - Run 3 (TOX) 2/17/00 14:52
Original value (CoefAf) = 408.1532 New value = 2002.2693
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: E43
Comment: 1068-10-02 - Run 3 (TOX) 2/17/00 14:52
Original value (CoefB) = 26.695 New value = 420.6992
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: F43
Comment: 1068-10-02 - Run 3 (TOX) 2/17/00 14:52
Original value (CoefD) = 0.0584 New value = 0.0686
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: J43
Comment: 1068-10-02 - Run 3 (TOX) 2/17/00 14:52
Original value (S) = 0 New value = -3.836
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: C97
Comment: 1068-20-01 - Run 2 (DBCM) 2/17/00 14:37
Original value (CoefA0) = -0.074 New value = -0.3728
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: D97
Comment: 1068-20-01 - Run 2 (DBCM) 2/17/00 14:37
Original value (CoefAf) = 2.4413 New value = 3.7578
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: E97
Comment: 1068-20-01 - Run 2 (DBCM) 2/17/00 14:37
Original value (CoefB) = 4.7158 New value = 16.4493
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: F97
Comment: 1068-20-01 - Run 2 (DBCM) 2/17/00 14:37
Original value (CoefD) = 0.152 New value = 0.6564
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: J97
Comment: 1068-20-01 - Run 2 (DBCM) 2/17/00 14:37
Original value (S) = -0.0018 New value = -0.0466
Poor peak curve fit. Data was refit by iterative curve fit procedure.

Cell: C118

Comment: 1068-20-02 - Run 4 (DBAA) 2/17/00 15:06
Original value (CoefA0) = 0 New value = -0.0939
Fewer than 6 points above MRL. Data was fit to peak curve by iterative curve fit procedure.

Cell: D118
Comment: 1068-20-02 - Run 4 (DBAA) 2/17/00 15:06
Original value (CoefAf) = 0 New value = 1.492
Fewer than 6 points above MRL. Data was fit to peak curve by iterative curve fit procedure.

Cell: E118
Comment: 1068-20-02 - Run 4 (DBAA) 2/17/00 15:06
Original value (CoefB) = 0 New value = 817.9222
Fewer than 6 points above MRL. Data was fit to peak curve by iterative curve fit procedure.

Cell: F118
Comment: 1068-20-02 - Run 4 (DBAA) 2/17/00 15:06
Original value (CoefD) = 0 New value = 0.1264
Fewer than 6 points above MRL. Data was fit to peak curve by iterative curve fit procedure.

Cell: J118
Comment: 1068-20-02 - Run 4 (DBAA) 2/17/00 15:06
Original value (S) = 0 New value = -0.0978
Fewer than 6 points above MRL. Data was fit to peak curve by iterative curve fit procedure.

Cell: C120
Comment: 1068-20-02 - Run 4 (DCAA) 2/17/00 15:02
Original value (CoefA0) = 0 New value = -0.2086
Fewer than 6 points above MRL. Logistic function (type 1) applied.

Cell: D120
Comment: 1068-20-02 - Run 4 (DCAA) 2/17/00 15:02
Original value (CoefAf) = 0 New value = 5.4455
Fewer than 6 points above MRL. Logistic function (type 1) applied.

Cell: E120
Comment: 1068-20-02 - Run 4 (DCAA) 2/17/00 15:02
Original value (CoefB) = 0 New value = 1810.8158
Fewer than 6 points above MRL. Logistic function (type 1) applied.

Cell: F120
Comment: 1068-20-02 - Run 4 (DCAA) 2/17/00 15:02
Original value (CoefD) = 0 New value = 0.1369
Fewer than 6 points above MRL. Logistic function (type 1) applied.

Cell: J120
Comment: 1068-20-02 - Run 4 (DCAA) 2/17/00 15:02
Original value (S) = 0 New value = 0
Fewer than 6 points above MRL. Logistic function (type 1) applied.

Cell: C130
Comment: 1068-20-02 - Run 4 (TOC) 2/17/00 14:53

Original value (CoefA0) = 0.5257 New value = -0.1669
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: D130
Comment: 1068-20-02 - Run 4 (TOC) 2/17/00 14:53
Original value (CoefAf) = 6 New value = 73.1837
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: E130
Comment: 1068-20-02 - Run 4 (TOC) 2/17/00 14:53
Original value (CoefB) = 20631338.8985126 New value = 263.8916
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: F130
Comment: 1068-20-02 - Run 4 (TOC) 2/17/00 14:53
Original value (CoefD) = 0.1644 New value = 0.0234
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: J130
Comment: 1068-20-02 - Run 4 (TOC) 2/17/00 14:53
Original value (S) = 0 New value = 0
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: C131
Comment: 1068-20-02 - Run 4 (TOX) 2/17/00 15:07
Original value (CoefA0) = 27.8421 New value = 4.7546
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: D131
Comment: 1068-20-02 - Run 4 (TOX) 2/17/00 15:07
Original value (CoefAf) = 277.5 New value = 210.3051
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: E131
Comment: 1068-20-02 - Run 4 (TOX) 2/17/00 15:07
Original value (CoefB) = 10137006.9048611 New value = 48.8101
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: F131
Comment: 1068-20-02 - Run 4 (TOX) 2/17/00 15:07
Original value (CoefD) = 0.1579 New value = 0.0407
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: J131
Comment: 1068-20-02 - Run 4 (TOX) 2/17/00 15:07
Original value (S) = 0 New value = 0
Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

Cell: C132
Comment: 1068-20-02 - Run 4 (TSUVA) 2/17/00 14:55
Original value (CoefA0) = 99999 New value = -0.0738

Fewer than 6 points. Logistic function (type 1) applied.

Cell: D132
Comment: 1068-20-02 - Run 4 (TSUVA) 2/17/00 14:55
Original value (CoefAf) = 99999 New value = 1.9535
Fewer than 6 points. Logistic function (type 1) applied.

Cell: E132
Comment: 1068-20-02 - Run 4 (TSUVA) 2/17/00 14:55
Original value (CoefB) = 99999 New value = 19.9412
Fewer than 6 points. Logistic function (type 1) applied.

Cell: F132
Comment: 1068-20-02 - Run 4 (TSUVA) 2/17/00 14:55
Original value (CoefD) = 99999 New value = 0.0473
Fewer than 6 points. Logistic function (type 1) applied.

Cell: J132
Comment: 1068-20-02 - Run 4 (TSUVA) 2/17/00 14:55
Original value (S) = 0 New value = 0
Fewer than 6 points. Logistic function (type 1) applied.

Saint Paul Water Utility | **Pilot-Scale GAC Treatment Study Summary** | **Session:** 1

ICR Information

ID / ICR#: MN1620026 / 428
ICR Contact: Martha Burckhardt
Phone No.: (651) 558-2116
Period: 10/21/98 - 11/18/98 (28 days)

Design Information

Design TOC: 4.3 mg/L
Col Diameter: 76.2 mm
Full-Scale GAC Size: 8x30 US Std Mesh
Full-Scale particle dia.: 1.480 mm
Meas Dry Bed Density: 450.0 kg/m3

Water Quality Summary

Influent	Mean	SD	Count	Min/Max
TOC	4.3	0.4	19	3.7 - 4.9
pH	6.8	0.2	19	6.5 - 7.3
UV254	0.077	0.018	19	0.010 - 0.096
SUVA	1.81	0.41	19	0.3 - 2.3
Bromide	0	0	11	0 - 0
SDS-TOX	502	75	13	370 - 640
SDS-THM4	287	38	13	219 - 343
SDS-HAA6	94	18	13	69 - 118
Ammonia	0.08	0.04	10	0.00 - 0.14

Effluent	10 Min EBCT			(40 days)	20 Min EBCT			(40 days)
Effluent pH	6.9	0.2	20	6.7 - 7.4	7.0	0.5	19	6.6 - 8.9
Effluent Temp	19.5	2.9	20	11.0 - 24.0	19.4	2.9	19	11.0 - 23.0

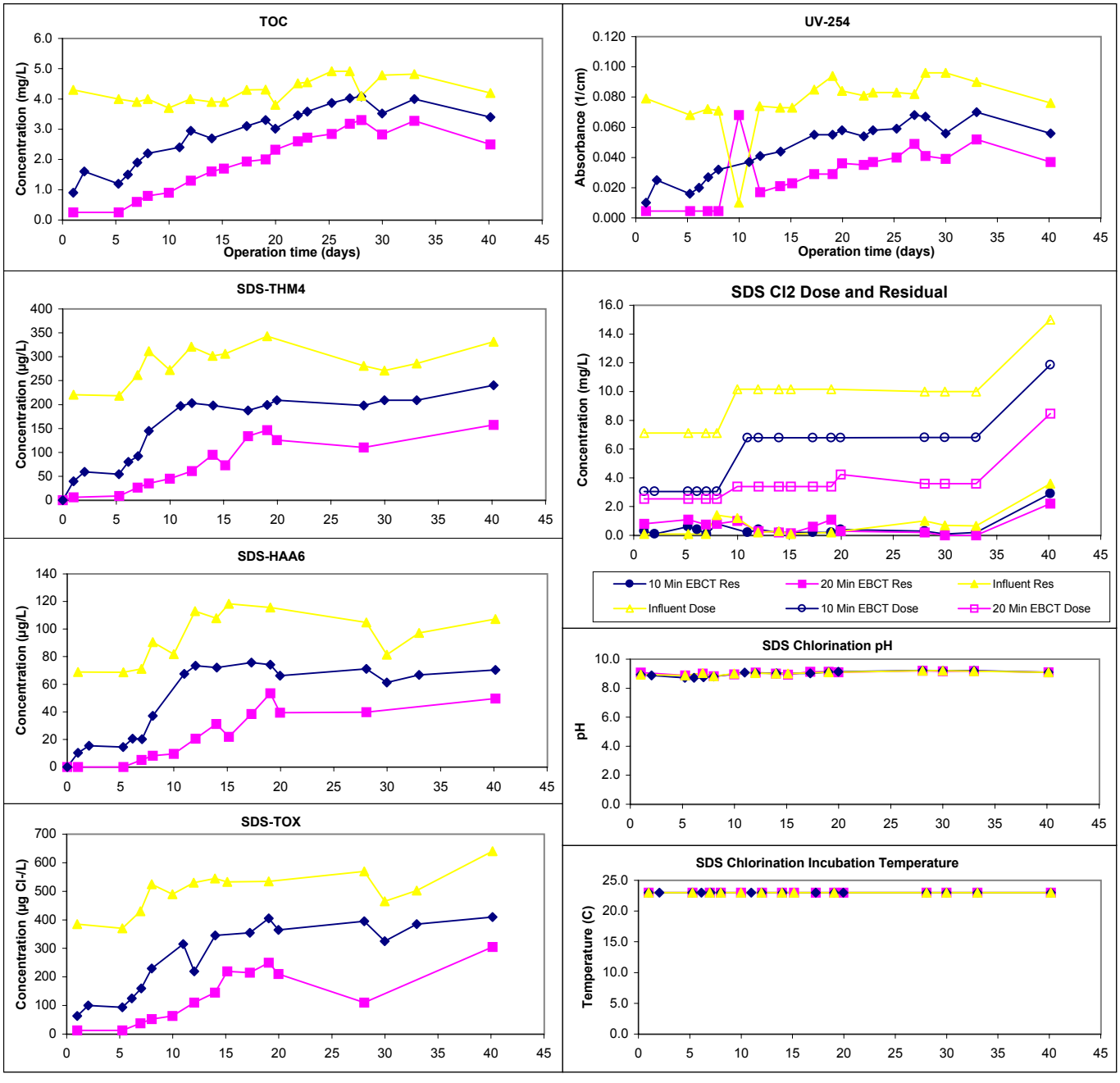
Cumulative SDS Conditions

	Mean	SD	Count	Min/Max
Res (2)	0.44	0.38	40	0.00 - 1.40
Temp	23.0	0.0	40	23.0 - 23.0
pH	9.0	0.1	40	8.7 - 9.2
Time	238.8	92.4	40	168.0 - 456.0

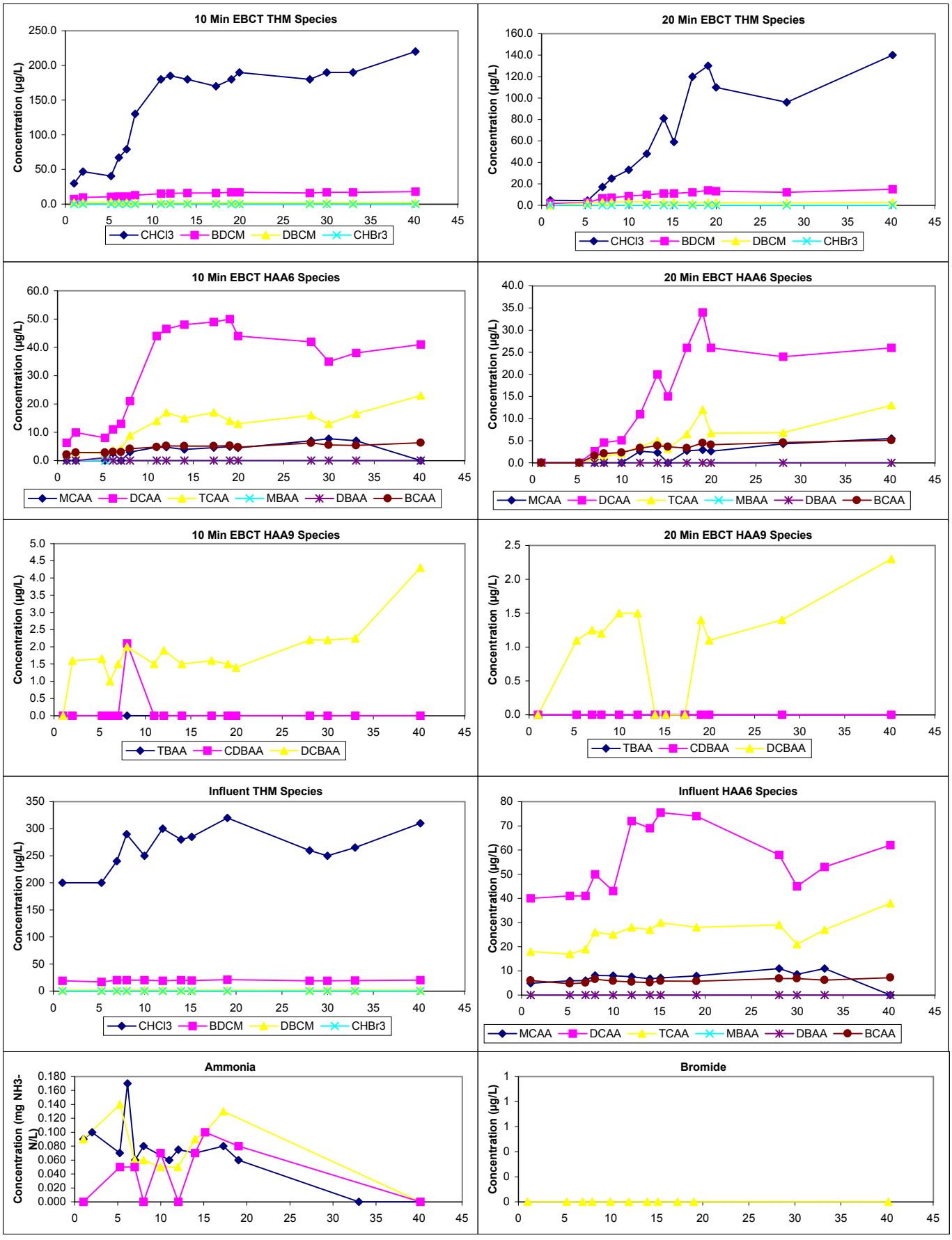
Comments:

Chart Legend: 10 Min EBCT; 20 Min EBCT; Influent

Water Quality Parameter Graphs



Water Quality Parameter Graphs (Continued)



Saint Paul Water Utility | **Pilot-Scale GAC Treatment Study Summary** | **Session:** 2

ICR Information

ID / ICR#: MN1620026 / 428
ICR Contact: Martha Burckhardt
Phone No.: (651) 558-2116
Period: 2/18/99 - 5/24/99 (95 days)

Design Information

Design TOC: 4.3 mg/L
Col Diameter: 76.2 mm
Full-Scale GAC Size: 12x40 US Std Mesh
Full-Scale particle dia.: 1.053 mm
Meas Dry Bed Density: 440.0 kg/m3

Water Quality Summary

Influent	Mean	SD	Count	Min/Max
TOC	3.5	0.4	17	2.9 - 4.1
pH	7.3	0.9	17	6.5 - 10.8
UV254	0.061	0.006	17	0.050 - 0.075
SUVA	1.74	0.16	17	1.5 - 2.0
Bromide	2	7	17	0 - 20
SDS-TOX	378	138	16	215 - 670
SDS-THM4	145	28	17	98 - 185
SDS-HAA6	52	6	17	40 - 61
Ammonia	0.16	0.16	17	0.00 - 0.50

Effluent	10 Min EBCT			(95 days)	20 Min EBCT			(104 days)
Effluent pH	7.2	0.4	19	6.0 - 8.3	7.3	0.7	17	6.0 - 9.7
Effluent Temp	12.3	1.7	19	10.0 - 16.0	13.2	2.2	17	11.0 - 18.0

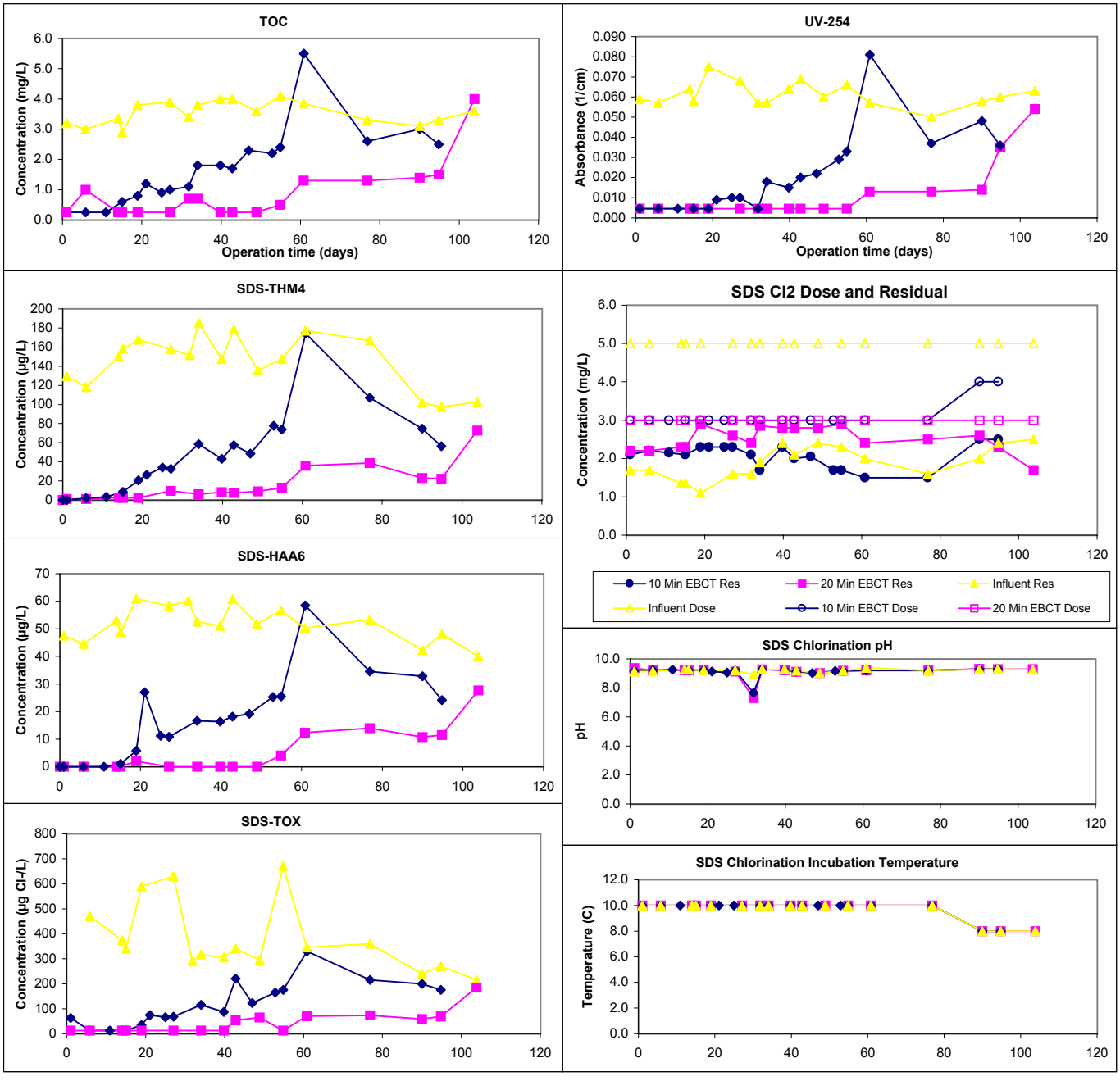
Cumulative SDS Conditions

	Mean	SD	Count	Min/Max
Res (0)	2.14	0.44	52	1.10 - 2.90
Temp	9.7	0.7	52	8.0 - 10.0
pH	9.1	0.3	52	7.3 - 9.4
Time	182.8	30.5	52	144.0 - 264.0

Comments:

Chart Legend: 10 Min EBCT; 20 Min EBCT; Influent

Water Quality Parameter Graphs



Water Quality Parameter Graphs (Continued)