

# ICR TREATMENT STUDY ANALYSIS

## Base Analysis and Data Review Comments

<b>Treatment Study ID</b>	1044
<b>Study Protocol</b>	GAC pilot-scale treatment study
<b>Plant ICR Number</b>	452
<b>PWS Name</b>	City of Raleigh
<b>City, State, Zip</b>	Raleigh, NC 27602

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

### Major comments:

None.

### General Comments:

1. Pilot-scale pretreatment for this study included ozonation and sand/anthracite filtration after full-scale conventional treatment. Full-scale treatment does not include ozonation.
2. Table 3-1 in the Summary Report indicates that the GAC particle diameter is 1.0 - 1.2 mm. Based on the product specifications data for Filtrasorb 820, the effective size, not the particle diameter, is 1.0 - 1.2 mm. The particle diameter is approximately 1.6 mm.

### Outlier Data:

Two outliers removed.

**Cell:** A1

**Comment:** 1044-SAS.xls 2/15/00 22:39

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

**Cell:** C2

**Comment:** 1044-10-01 - Run 1 (BCAA) 2/15/00 22:24

Original value (CoefA0) = -0.0286 New value = -0.0083

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

**Cell:** D2

**Comment:** 1044-10-01 - Run 1 (BCAA) 2/15/00 22:24

Original value (CoefAf) = 4.875 New value = 2.5606

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

**Cell:** E2

**Comment:** 1044-10-01 - Run 1 (BCAA) 2/15/00 22:24

Original value (CoefB) = 454.4694 New value = 539.4794

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

**Cell:** F2

**Comment:** 1044-10-01 - Run 1 (BCAA) 2/15/00 22:24

Original value (CoefD) = 0.0387 New value = 0.0495

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

**Cell:** J2

**Comment:** 1044-10-01 - Run 1 (BCAA) 2/15/00 22:24

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:** C3

**Comment:** 1044-10-01 - Run 1 (BDCM) 2/15/00 22:26

Original value (CoefA0) = 0.0673 New value = -0.674

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

**Cell:** D3

**Comment:** 1044-10-01 - Run 1 (BDCM) 2/15/00 22:26

Original value (CoefAf) = 7.2142 New value = 8.8958

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

**Cell:** E3

**Comment:** 1044-10-01 - Run 1 (BDCM) 2/15/00 22:26

Original value (CoefB) = 485.8712 New value = 25.0844

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

**Cell:** F3

**Comment:** 1044-10-01 - Run 1 (BDCM) 2/15/00 22:26

Original value (CoefD) = 0.0595 New value = 0.0281

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

**Cell:** J3

**Comment:** 1044-10-01 - Run 1 (BDCM) 2/15/00 22:26  
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:** C7

**Comment:** 1044-10-01 - Run 1 (CI2-D) 2/15/00 22:25  
Original value (CoefA0) = -0.3124 New value = 0.3812  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** D7

**Comment:** 1044-10-01 - Run 1 (CI2-D) 2/15/00 22:25  
Original value (CoefAf) = 3.81 New value = 1.1962  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** E7

**Comment:** 1044-10-01 - Run 1 (CI2-D) 2/15/00 22:25  
Original value (CoefB) = 3.8843 New value = 8.3658  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** F7

**Comment:** 1044-10-01 - Run 1 (CI2-D) 2/15/00 22:25  
Original value (CoefD) = 0.0063 New value = 0.02  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** J7

**Comment:** 1044-10-01 - Run 1 (CI2-D) 2/15/00 22:25  
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:** C16

**Comment:** 1044-10-01 - Run 1 (MCAA) 2/15/00 22:32  
Original value (CoefA0) = 0.0103 New value = -0.4244  
Poor peak curve fit. Data was refit by iterative curve fit procedure.

**Cell:** D16

**Comment:** 1044-10-01 - Run 1 (MCAA) 2/15/00 22:32  
Original value (CoefAf) = 2.0264 New value = 3.9204  
Poor peak curve fit. Data was refit by iterative curve fit procedure.

**Cell:** E16

**Comment:** 1044-10-01 - Run 1 (MCAA) 2/15/00 22:32  
Original value (CoefB) = 236897002380355 New value = 13.7468  
Poor peak curve fit. Data was refit by iterative curve fit procedure.

**Cell:** F16

**Comment:** 1044-10-01 - Run 1 (MCAA) 2/15/00 22:32  
Original value (CoefD) = 0.4423 New value = 0.0198  
Poor peak curve fit. Data was refit by iterative curve fit procedure.

**Cell:** J16

**Comment:** 1044-10-01 - Run 1 (MCAA) 2/15/00 22:32  
Original value (S) = -0.0148 New value = -0.0189  
Poor peak curve fit. Data was refit by iterative curve fit procedure.

**Cell:** C22

**Comment:** 1044-10-01 - Run 1 (TSUVA) 2/15/00 22:23  
Original value (CoefA0) = 0.0585 New value = -0.2055  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** D22

**Comment:** 1044-10-01 - Run 1 (TSUVA) 2/15/00 22:23  
Original value (CoefAf) = 0.985 New value = 1.2953  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** E22

**Comment:** 1044-10-01 - Run 1 (TSUVA) 2/15/00 22:23  
Original value (CoefB) = 1306.2457 New value = 20.0001  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** F22

**Comment:** 1044-10-01 - Run 1 (TSUVA) 2/15/00 22:23  
Original value (CoefD) = 0.1161 New value = 0.0575  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** J22

**Comment:** 1044-10-01 - Run 1 (TSUVA) 2/15/00 22:23  
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:** C95

**Comment:** 1044-20-01 - Run 2 (CI2-D) 2/15/00 22:34  
Original value (CoefA0) = -1.0631 New value = -0.803  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** D95

**Comment:** 1044-20-01 - Run 2 (CI2-D) 2/15/00 22:34  
Original value (CoefAf) = 4.2558 New value = 4.4624  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** E95

**Comment:** 1044-20-01 - Run 2 (CI2-D) 2/15/00 22:34  
Original value (CoefB) = 1.3083 New value = 2.4434  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** F95

**Comment:** 1044-20-01 - Run 2 (CI2-D) 2/15/00 22:34  
Original value (CoefD) = 0.0113 New value = 0.0041  
Peak curve fit with S = 0. Refit to type 1 curve fit by iterative curve fit procedure.

**Cell:** J95

**Comment:** 1044-20-01 - Run 2 (CI2-D) 2/15/00 22:34

Original value (S) = -0.0035 New value = 0

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

**Cell:** C108

**Comment:** 1044-20-01 - Run 2 (TOC) 2/15/00 22:33

Original value (CoefA0) = 0 New value = 0.1086

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** D108

**Comment:** 1044-20-01 - Run 2 (TOC) 2/15/00 22:33

Original value (CoefAf) = 0.99 New value = 28.656

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** E108

**Comment:** 1044-20-01 - Run 2 (TOC) 2/15/00 22:33

Original value (CoefB) = 1.1254 New value = 549.7265

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** F108

**Comment:** 1044-20-01 - Run 2 (TOC) 2/15/00 22:33

Original value (CoefD) = 0 New value = 0.0101

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** J108

**Comment:** 1044-20-01 - Run 2 (TOC) 2/15/00 22:33

Original value (S) = 0 New value = 0

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** C109

**Comment:** 1044-20-01 - Run 2 (TOX) 2/15/00 22:36

Original value (CoefA0) = -65 New value = 22.8232

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** D109

**Comment:** 1044-20-01 - Run 2 (TOX) 2/15/00 22:36

Original value (CoefAf) = 195 New value = 1508.6475

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** E109

**Comment:** 1044-20-01 - Run 2 (TOX) 2/15/00 22:36

Original value (CoefB) = 1.5353 New value = 2940.2339

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** F109

**Comment:** 1044-20-01 - Run 2 (TOX) 2/15/00 22:36

Original value (CoefD) = 0.0048 New value = 0.016

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

**Cell:** J109

**Comment:** 1044-20-01 - Run 2 (TOX) 2/15/00 22:36

Original value (S) = 0 New value = 0

Poor type -1 or 1 curve fit. Data was refit by iterative curve fit procedure.

ID / ICR#: NC 0392010 / 452

Design TOC: 2 mg/L

Full-Scale GAC Size: 8x20 US Std Mesh

ICR Contact: Mr. John Garland

Col Diameter: 153.9 mm

Full-Scale particle dia.: 1.605 mm

Phone No.: 919-870-2870

Meas Dry Bed Density: 465.00 kg/m3

Period: 4/14/98 - 6/22/98 (69 days)

Influent					Cumulative SDS Conditions				
	Mean	SD	Count	Min/Max		Mean	SD	Count	Min/Max
TOC	1.8	0.2	23	1.4 - 2.2	Res (0)	0.84	0.28	95	0.14 - 1.37
pH	5.6	0.4	22	4.9 - 6.9	Temp	22.3	6.0	98	11.0 - 30.9
UV254	0.023	0.004	23	0.017 - 0.036	pH	7.5	0.0	98	7.5 - 7.5
SUVA	NA	NA	0	0.0 - 0.0	Time	48.0	0.0	98	48.0 - 48.0
Bromide	14.08	12.55	18	0.0 - 31.5	Comments:				
SDS-TOX	138	30	20	65 - 203					
SDS-THM4	35	10	23	22 - 59					
SDS-HAA6	27	7	22	16 - 50					
Ammonia	0.01	0.04	23	0.00 - 0.14					
Effluent					Chart				
	Mean	SD	Count	Min/Max	Legend:				
10 Min EBCT (169 days)	5.8	0.8	24	4.9 - 9.2					
20 Min EBCT (169 days)	5.2	1.1	21	4.8 - 10.1					
Effluent pH	25.6	3.4	24	19.1 - 31.4					
Effluent Temp	25.2	3.2	21	19.7 - 29.5					



