Attachment I

Instream Water Quality Data for Existing Baseline Antidegradation Calculations

- Upstream Roanoke River Dissolved Metals Data Summary (1994-1998)
- Upstream Chloride Data (1996-2001) (4AROA202.20)
- Upstream Water Quality Lab Data Reports

Western Virginia Water Authority WPCP
VA0025020

Upstream Roanoke River Dissolved Metals Data (ug/L)

	3/24/94	4/12/94*	5/13/94	6/15/94	7/12/94	8/94	9/94	10/19/94	11/15/94	12/9/94	1/95	2/95	8/2/95	11/21/95	6/25/96	12/12/96	5/13/97	10/30/97	5/20/98
As	<1	~~<2~~	<2	2	<2	7	<2	<2	<2	<2	<2	<2	<5	<2	<5	<2	<2	<2	<2
Cd	0.17	~~6~~	0.3	<0.1	<0.1	<0.1	0.4	0.1	0.2	0.4	<0.1	0.1	0.1	<1	<0.5	<1	<1	<1	<1
Cr III	<7	~~50~~	1	1	<1	<1	<1	<1	<1	<1	<1	1.6	<1	6	<10	<5	<5	<5	<5
Cr VI	<10	~~<10~~	<10	<10	<50	<10	<10	<10	<1	<50	<10	<10	<10	<10	<10		<10		<10
Cu	<10	~~50~~	1	3	1	4	3	1	<1	2	<1	2.5	1	<10	<10	<30	<5	6	<30
Pb	<1	~~1~~	3	2	1	5	4	1	13	2	1.5	<1	<1	<1	<0.5	<1	<1	1	<1
Hg	<0.2	~~0.1~~	0.1	0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.2	0.4	<0.2
Ni	<12	~~92~~	<40	14	1	5	1	1	<10	<1	<1	4	1	<10	<5	<10	<40	<40	<40
Se	<2	~~3~~	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2
Ag	<0.1	~~110~~	0.7	1.6	<0.5	0.6	2.8	2.3	11	1.8	1.1	<0.5	<0.5	<0.2	<2	<0.2	<0.2	<0.2	<0.2
Zn	14.8	~~29~~	33	<5	<5	11	15	<25	<10	0.4	<25	<10	<10	10	<10	<10	10	60	10

* Data for 4/12/94 not used due to extreme outliers

VAW-L04R Roanoke River
4AROA202.20 (14th Street Bridge above WVWA WPCP outfall 001)

Ammonia as Nitrogen

Collection Date Time	(mg/L)	Com Code
1/21/1998 11:00	0.04	U
2/11/1998 7:15	0.04	U
3/9/1998 10:20	**0.04**	NULL
4/14/1998 10:15	0.04	U
5/26/1998 10:20	0.04	U
6/8/1998 10:00	0.04	U
7/14/1998 10:50	0.04	U
8/24/1998 10:15	0.04	U
9/23/1998 11:40	**0.04**	NULL
10/27/1998 10:15	0.04	U
11/9/1998 8:35	0.04	U
12/3/1998 10:20	0.04	U
1/5/1999 10:55	0.04	U
1/11/1999 11:30	0.04	U
2/2/1999 9:50	**0.07**	NULL
3/17/1999 10:10	0.04	U
4/14/1999 10:15	0.04	U
5/5/1999 9:00	0.04	U
6/9/1999 9:40	0.04	U
7/22/1999 9:30	**0.36**	NULL
8/11/1999 9:30	**0.05**	NULL
9/20/1999 9:00	0.04	U
11/17/1999 9:30	0.04	U
12/15/1999 10:25	0.04	U
1/25/2000 9:30	0.04	U
2/15/2000 9:45	0.04	U
3/1/2000 10:25	0.04	U
4/12/2000 9:10	0.04	U
5/18/2000 10:05	**0.04**	NULL
6/13/2000 10:40	0.04	U
7/18/2000 12:30	0.04	U
8/9/2000 13:00	0.04	U
9/19/2000 12:00	**0.06**	NULL
10/11/2000 12:00	0.04	U
11/9/2000 11:00	0.04	U
12/13/2000 11:00	0.04	U
1/18/2001 13:30	0.04	U
2/15/2001 11:00	0.04	U
3/19/2001 11:30	0.04	U
4/2/2001 12:00	0.04	U
5/1/2001 11:00	0.04	U
6/4/2001 13:00	0.04	U
7/24/2001 9:00	0.04	U
8/7/2001 9:00	0.04	U
9/10/2001 10:00	**0.04**	NULL

U= not quantifiable

VAW-L04R Roanoke River
4AROA202.20 (14th Street Bridge above WVWA WPCP outfall 001)

Ammonia as Nitrogen

Collection Date Time	(mg/L)	Com Code
10/10/2001 10:30	0.04	U
11/19/2001 9:30	0.04	U
12/19/2001 9:00	0.04	U
1/14/2002 10:30	0.04	U
2/4/2002 9:00	0.04	U
3/11/2002 10:00	0.04	U
4/1/2002 10:00	0.04	U
5/2/2002 15:30	**0.06**	NULL
6/4/2002 8:15	**0.04**	NULL
7/30/2002 8:45	**0.04**	NULL
8/27/2002 8:50	**0.05**	NULL
9/25/2002 9:00	0.04	U
10/23/2002 9:15	0.04	U
11/19/2002 9:20	0.04	U
12/16/2002 9:30	0.04	U
1/14/2003 9:20	0.04	U
2/11/2003 8:30	0.04	U
3/4/2003 10:00	0.04	U
4/3/2003 10:00	0.04	U
5/5/2003 10:00	0.04	U
6/19/2003 10:00	0.04	U
7/13/2005 12:30	0.04	U
9/19/2005 11:30	0.04	U
11/28/2005 11:30	0.04	U
1/10/2006 12:00	0.04	U
3/8/2006 11:30	0.04	U
5/4/2006 11:00	0.04	U
7/17/2006 12:00	0.04	U
9/12/2006 10:00	0.04	U
11/7/2006 13:00	0.04	U

VAW-L04R Roanoke River
4AROA202.20 (14th Street Bridge above WVWA WWTP outfall 001)

Chloride, Total

Collection Date Time	mg/L
1/17/1996 10:05	14.4
2/14/1996 10:00	9.8
3/6/1996 10:00	9.5
4/9/1996 11:40	7.9
5/6/1996 11:30	7.8
6/6/1996 10:30	8.4
7/29/1996 10:50	9.2
8/27/1996 10:45	8.1
9/25/1996 7:45	9.3
10/23/1996 10:10	9.3
11/6/1996 12:20	9.2
12/12/1996 12:15	6.9
1/13/1997 11:35	10.7
2/5/1997 10:55	7.7
3/18/1997 8:50	8.4
4/14/1997 11:00	7.2
5/20/1997 10:05	7.6
6/16/1997 10:20	13.4
7/14/1997 11:10	9
8/18/1997 11:15	9
9/16/1997 10:00	9.5
10/22/1997 10:30	9.1
11/6/1997 8:45	9.9
12/4/1997 9:45	10
1/21/1998 11:00	9.2
2/11/1998 7:15	8.5
3/9/1998 10:20	7.5
4/14/1998 10:15	6.5
5/26/1998 10:20	5.6
6/8/1998 10:00	7.3
7/14/1998 10:50	9.6
8/24/1998 10:15	10.1
9/23/1998 11:40	10.2
10/27/1998 10:15	9.6
11/9/1998 8:35	11.2
12/3/1998 10:20	10.3
1/5/1999 10:55	12.4
1/11/1999 11:30	24.5
2/2/1999 9:50	37.9
3/17/1999 10:10	13.4
4/14/1999 10:15	7.9
5/5/1999 9:00	8.85
6/9/1999 9:40	14
7/22/1999 9:30	7.1
8/11/1999 9:30	14.1
9/20/1999 9:00	10.6

11/17/1999 9:30	10.9
12/15/1999 10:25	7.9
1/25/2000 9:30	17
2/15/2000 9:45	11.7
3/1/2000 10:25	11.7
4/12/2000 9:10	9.4
5/18/2000 10:05	13.3
6/13/2000 10:40	13.5
7/18/2000 12:30	11.8
8/9/2000 13:00	15.6
9/19/2000 12:00	6.9
10/11/2000 12:00	11.2
11/9/2000 11:00	11.7
12/13/2000 11:00	11.4
1/18/2001 13:30	12
2/15/2001 11:00	11.4
3/19/2001 11:30	12.1
4/2/2001 12:00	7.7
5/1/2001 11:00	10.9
6/4/2001 13:00	9.9

Mean 10.7 mg/L

Water Chemistry inc.
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Environmental Services Division

Laboratories and Consultants

Date Reported: June 2, 1998
Sample Code: 98-1894
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, SE
Roanoke VA 24014

Chain of Custody Information

Date Collected: May 20, 1998
Time Collected: 1335
Collected By: Client
Collection Method: Composite
Sample Description: Total Dissolved Metals
Roanoke River bridge

Date Received: May 20, 1998
Time Received: 1435
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 98-1894

Parameter	Result	MDL	Method	Date	Analyst
Arsenic	<0.002 mg/L	0.002 mg/L	SM 3113B	05/25/98	RMP
Cadmium	<0.001 mg/L	0.001 mg/L	SM 3113B	05/28/98	RMP
Chromium	<0.005 mg/L	0.005 mg/L	SM 3113B	05/22/98	RMP
Copper	<0.03 mg/L	0.03 mg/L	SM 3111B	05/28/98	RMP
Lead	<0.001 mg/L	0.001 mg/L	SM 3113B	05/25/98	RMP
Mercury	<0.0002 mg/L	0.0002 mg/L	SM 3112B	05/26/98	RMP
Nickel	<0.04 mg/L	0.04 mg/L	SM 3111B	05/28/98	RMP
Selenium	<0.002 mg/L	0.002 mg/L	SM 3113B	06/01/98	RMP
Silver	<0.0002 mg/L	0.0002 mg/L	SM 3113B	05/22/98	RMP
Zinc	0.01 mg/L	0.01 mg/L	SM 3111B	05/27/98	RMP
Hardness	229.8 mg$CaCO_3$/L	4.6 mg$CaCO_3$/L	SM 2340C	05/27/98	BRV
	13.44 gr$CaCO_3$/gal	0.27 gr$CaCO_3$/gal	WCI	05/27/98	BRV

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423

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Environmental Services Division

Laboratories and Consultants

Date Reported: June 12, 1998
Sample Code: 98-1890
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, SE
Roanoke VA 24014

Chain of Custody Information

Date Collected: May 20, 1998
Time Collected: 0855
Collected By: Client
Collection Method: Grab
Sample Description: Roanoke River

Date Received: May 20, 1998
Time Received: 1240
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 98-1890

Parameter	Result	MDL	Method	Date	Analyst
Hexavalent Chromium	<0.01 mg/L	0.01 mg/L	SM 3111B	05/21/98	RMP
Cyanide	<0.02 mg/L	0.02 mg/L	EPA 335.2	05/29/98	KLC

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

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Environmental Services Division

Laboratories and Consultants

Date Reported: December 3, 1997
Sample Code: 49694
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: October 30, 1997
Time Collected: 0845
Collected By: M. Sensabaugh
Collection Method: Composite
Sample Description: Roanoke River

Date Received: October 30, 1997
Time Received: 1430
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes: Reissued to correct results for dissolved and total barium.

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 49694

Parameter	Result	MDL	Method	Date	Analyst
Dissolved Metals:					
Dissolved Arsenic	<0.002 mg/L	0.002 mg/L	EPA 206	11/12/97	R. PHILLIPS
Dissolved Cadmium	<0.001 mg/L	0.001 mg/L	EPA 213.2	11/05/97	R. PHILLIPS
Dissolved Chromium	<0.005 mg/L	0.005 mg/L	EPA 218.2	11/11/97	R. PHILLIPS
Dissolved Copper	0.006 mg/L	0.005 mg/L	EPA 220.2	11/13/97	R. PHILLIPS
Dissolved Lead	0.001 mg/L	0.001 mg/L	EPA 239.2	11/07/97	R. PHILLIPS
Dissolved Mercury	0.0004 mg/L	0.0002 mg/L	EPA 245.1	11/10/97	R. PHILLIPS
Dissolved Nickel	<0.04 mg/L	0.04 mg/L	EPA 249.2	11/04/97	R. PHILLIPS
Dissolved Selenium	<0.002 mg/L	0.002 mg/L	EPA 270.2	11/12/97	R. PHILLIPS
Dissolved Silver	<0.0002 mg/L	0.0002 mg/L	EPA 272.2	11/06/97	R. PHILLIPS
Dissolved Zinc	0.06 mg/L	0.01 mg/L	EPA 289.1	11/05/97	R. PHILLIPS
Dissolved Barium	0.019 mg/L	0.010 mg/L	EPA 208.2	11/12/97	R. PHILLIPS
Hardness	140.6 mg$CaCO_3$/L	3.8 mg$CaCO_3$/L	SM 2340C	11/03/97	J. PORTER
	8.22 gr$CaCO_3$/gal	0.22 gr$CaCO_3$/gal	WCI	11/03/97	J. PORTER

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Environmental Services Division

Laboratories and Consultants

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Date Reported: December 3, 1997
Sample Code: **49694 pg.2**
Prepared By: **T. Rakes**

Chain of Custody Information

Date Collected: October 30, 1997
Time Collected: 0845
Collected By: M. Sensabaugh
Collection Method: Composite
Sample Description: Roanoke River

Date Received: October 30, 1997
Time Received: 1430
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: **49694 pg.2**

Parameter	Result	MDL	Method	Date	Analyst
Total Metals:					
Total Arsenic	<0.002 mg/L	0.002 mg/L	EPA 206	11/12/97	R. PHILLIPS
Total Cadmium	<0.001 mg/L	0.001 mg/L	EPA 213.2	11/05/97	R. PHILLIPS
Total Chromium	<0.005 mg/L	0.005 mg/L	EPA 218.2	11/11/97	R. PHILLIPS
Total Copper	0.008 mg/L	0.005 mg/L	EPA 220.2	11/13/97	R. PHILLIPS
Total Lead	0.002 mg/L	0.001 mg/L	EPA 239.2	11/07/97	R. PHILLIPS
Total Mercury	0.0012 mg/L	0.0002 mg/L	EPA 245.1	11/10/97	R. PHILLIPS
Total Nickel	<0.04 mg/L	0.04 mg/L	EPA 249.2	11/04/97	R. PHILLIPS
Total Selenium	<0.002 mg/L	0.002 mg/L	EPA 270.2	11/12/97	R. PHILLIPS
Total Silver	0.0010 mg/L	0.0002 mg/L	EPA 272.2	11/06/97	R. PHILLIPS
Total Zinc	0.05 mg/L	0.01 mg/L	EPA 289.1	11/05/97	R. PHILLIPS
Total Barium	0.023 mg/L	0.010 mg/L	EPA 208.2	11/12/97	R. PHILLIPS
Hardness	186.2 mg$CaCO_3$/L	3.8 mg$CaCO_3$/L	SM 2340C	11/03/97	J. PORTER
	10.89 gr$CaCO_3$/gal	0.22 gr$CaCO_3$/gal	WCI	11/03/97	J. PORTER

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Environmental Services Division

Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46721
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0900
Collected By: M. Sensabuagh
Collection Method: Composite
Sample Description: Roanoke River

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46721

Parameter	Result	MDL	Method	Date	Analyst
Total Arsenic	<0.002 mg/L	0.002 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Total Cadmium	<0.001 mg/L	0.001 mg/L	SM 3113B	05/16/97	C. EASTER
Total Chromium	<0.005 mg/L	0.005 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Total Copper	<0.005 mg/L	0.005 mg/L	SM 3113B	05/16/97	C. EASTER
Total Lead	<0.001 mg/L	0.001 mg/L	SM 3113B	05/15/97	C. EASTER
Total Mercury	<0.0002 mg/L	0.0002 mg/L	SM 3112B	05/21/97	M. HILGER
Total Nickel	<0.04 mg/L	0.04 mg/L	SM 3111B	05/15/97	C. EASTER
Total Selenium	<0.002 mg/L	0.002 mg/L	SM 3113B	05/22/97	R. PHILLIPS
Total Silver	<0.0002 mg/L	0.0002 mg/L	SM 3113B	05/19/97	R. PHILLIPS
Total Zinc	0.04 mg/L	0.01 mg/L	SM 3111B	05/15/97	C. EASTER
Hardness	160 mg$CaCO_3$/L	4.0 mg$CaCO_3$/L	SM 2340C	05/19/97	J. MORRIS
	9.36 gr$CaCO_3$/gal	0.23 gr$CaCO_3$/gal	WCI	05/19/97	J. MORRIS

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423 Maryland #183

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Environmental Services Division

Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46721 p.2
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0900
Collected By: M. Sensabuagh
Collection Method: Grab
Sample Description: Roanoke River

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46721 p.2

Parameter	Result	MDL	Method	Date	Analyst
Dissolved Arsenic	<0.002 mg/L	0.002 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Dissolved Cadmium	<0.001 mg/L	0.001 mg/L	SM 3113B	05/16/97	C. EASTER
Dissolved Chromium	<0.005 mg/L	0.005 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Dissolved Copper	<0.005 mg/L	0.005 mg/L	SM 3113B	05/16/97	C. EASTER
Dissolved Lead	<0.001 mg/L	0.001 mg/L	SM 3113B	05/15/97	C. EASTER
Dissolved Mercury	<0.0002 mg/L	0.0002 mg/L	SM 3112B	05/21/97	M. HILGER
Dissolved Nickel	<0.04 mg/L	0.04 mg/L	SM 3111B	05/15/97	C. EASTER
Dissolved Selenium	<0.002 mg/L	0.002 mg/L	SM 3113B	05/22/97	R. PHILLIPS
Dissolved Silver	<0.0002 mg/L	0.0002 mg/L	SM 3113B	05/19/97	R. PHILLIPS
Dissolved Zinc	0.01 mg/L	0.01 mg/L	SM 3111B	05/15/97	C. EASTER

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

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Environmental Services Division

Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46722
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0940
Collected By: M. Sensabuagh
Collection Method: Grab
Sample Description: Roanoke River

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46722

Parameter	Result	MDL	Method	Date	Analyst
Hexachromium	<0.01 mg/L	0.01 mg/L	EPA 218.4	05/14/97	C. EASTER

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

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D. C. Crane

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Environmental Services Division
Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46723
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0940
Collected By: M. Sensabaugh
Collection Method: Grab
Sample Description: Roanoke River

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46723

Parameter	Result	MDL	Method	Date	Analyst
Cyanide	<0.02 mg/L	0.02 mg/L	EPA 335.2	05/15/97	M. HILGER

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423 Maryland #183

Environmental Testing, Consultants

Water Chemistry inc.
3404 Aerial Way Drive • Roanoke, VA 24018
Phone (540) 343-3618 • Fax (540) 342-2054

Environmental Services Division

Laboratories and Consultants

Date Reported: June 2, 1998
Sample Code: 98-1893
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, SE
Roanoke VA 24014

Chain of Custody Information

Date Collected: May 20, 1998
Time Collected: 1335
Collected By: Client
Collection Method: Composite
Sample Description: Total Recoverable Metals
Roanoke River bridge

Date Received: May 20, 1998
Time Received: 1435
Sample Type: Waste Water

Project Name: Roanoke River
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 98-1893

Parameter	Result	MDL	Method	Date	Analyst
Arsenic	<0.002 mg/L	0.002 mg/L	SM 3113B	05/25/98	RMP
Cadmium	<0.001 mg/L	0.001 mg/L	SM 3113B	05/28/98	RMP
Chromium	<0.005 mg/L	0.005 mg/L	SM 3113B	05/22/98	RMP
Copper	<0.03 mg/L	0.03 mg/L	SM 3111B	05/28/98	RMP
Lead	<0.001 mg/L	0.001 mg/L	SM 3113B	05/25/98	RMP
Mercury	<0.0002 mg/L	0.0002 mg/L	SM 3112B	05/26/98	RMP
Nickel	<0.04 mg/L	0.04 mg/L	SM 3111B	05/28/98	RMP
Selenium	<0.002 mg/L	0.002 mg/L	SM 3113B	06/01/98	RMP
Silver	<0.0002 mg/L	0.0002 mg/L	SM 3113B	05/22/98	RMP
Zinc	0.01 mg/L	0.01 mg/L	SM 3111B	05/27/98	RMP
Hardness	275.8 mg$CaCO_3$/L	4.6 mg$CaCO_3$/L	SM 2340C	05/27/98	BRV
	16.12 gr$CaCO_3$/gal	0.27 gr$CaCO_3$/gal	WCI	05/27/98	BRV

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423

Environmental Testing, Consulting, and Field Services

Q BioChem, L.L.C.
Analysis, Research & Technology Development

A USEPA Contract Laboratory

DEQ-WCRO
DEC 1 0 1998
RECEIVED

Roanoke Regional Water Pollution Control
1402 Bennington St. S.E.
Roanoke, VA 24014
ATTN: Mr. Marty Sensabaugh

Re: Laboratory Analysis
Q BioChem Client No. 10384
Permit Required River/FAS

REPORT DATE/NUMBER: November 13, 1998 / 157

ANALYSIS FOR: Total and Dissolved Metals, Hardness, Cr+6

METHOD OF ANALYSIS: USEPA Methods 200.7, 235.1, 130.2; Standard Methods 18th Edition 3500Cr

SAMPLE ANALYSIS DATA

CLIENT ID: RKE. RIVER
MATRIX: Water
COLLECTION DATE: 11/03/98
OTHER ID: NPDES
DESCRIPTION: PERMIT REQUIRED RIVER/FAS

LAB ID: 234853
COLLECTED BY: CLIENT
DATE RECEIVED: 11/04/98
TIME COLLECTED: 1115

METALS/ELEMENTS RESULTS:

Arsenic — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Arsenic, Dissolved — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Cadmium — < 1.00 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=1.00 ug/l

Cadmium, Dissolved — < 1.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=1.00 ug/l

REPORT CONTINUED ON NEXT PAGE

1401 Municipal Road, Roanoke, VA 24012-1309 • 800-897-0297
540-265-7211 (voice) • 540-563-4866 (fax)
qbiochem@roanoke.infi.net (e-mail)

SAMPLE ANALYSIS DATA

CLIENT ID: RKE. RIVER ▪ LAB ID: 234853 (continued)

Copper — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Copper, Dissolved — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Lead — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Lead, Dissolved — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Mercury — < 0.20 ug/l
↳Analysis Date: 11/06/98 Time: 10:13 by: LBH Run ID: 110698CV
↳Method: CVAAS, USEPA 245.1; Quantitation Limit=0.20 ug/l

Mercury, Dissolved — < 0.20 ug/l
↳Analysis Date: 11/06/98 Time: 10:21 by: LBH Run ID: 110698CV
↳Method: CVAAS, USEPA 245.1; Quantitation Limit=0.20 ug/l

Nickel — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Nickel, Dissolved — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Silver — < 2.00 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=2.00 ug/l

Silver, Dissolved — < 2.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=2.00 ug/l

Trivalent Chromium — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

CLIENT ID: RKE. RIVER ▪ LAB ID: 234853 (continued)

Trivalent Chromium, Dissolved ——— < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Zinc ——— 8.17 ug/l
↳Analysis Date: 11/10/98 Time: 09:49 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Zinc, Dissolved ——— 6.77 ug/l
↳Analysis Date: 11/10/98 Time: 10:07 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

ROUTINE LABORATORY RESULTS:

Hardness ——— 229 mg/l
↳Analysis Date: 11/11/98 Time: 14:38 by: LAF Run ID: HRD111198
↳Method: Titrimetric, USEPA 130.2; Quantitation Limit=1 mg/l

Hexavalent Chromium, Dissolved ——— < 0.010 mg/l
↳Analysis Date: 11/05/98 Time: 11:12 by: LAF Run ID: CR6110598
↳Method: Colorimetric, SM 3500Cr D; Quantitation Limit=0.010 mg/l

Hexavalent Chromium, Total ——— < 0.010 mg/l
↳Analysis Date: 11/05/98 Time: 11:10 by: LAF Run ID: CR6110598
↳Method: Colorimetric, SM 3500Cr D; Quantitation Limit=0.010 mg/l

CLIENT ID: FAS
MATRIX: Water
COLLECTION DATE: 11/03/98
OTHER ID: NPDES
DESCRIPTION: PERMIT REQUIRED RIVER/FAS

LAB ID: 234854
COLLECTED BY: CLIENT
DATE RECEIVED: 11/04/98
TIME COLLECTED: 1000

METALS/ELEMENTS RESULTS:

Arsenic ——— < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Arsenic, Dissolved ——— < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

CLIENT ID: FAS ▪ LAB ID: 234854 (continued)

Cadmium ——— < 1.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=1.00 ug/l

Cadmium, Dissolved ——— < 1.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=1.00 ug/l

Copper ——— 5.62 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Copper, Dissolved ——— < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Lead ——— < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Lead, Dissolved ——— < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Mercury, Dissolved ——— < 0.20 ug/l
↳Analysis Date: 11/06/98 Time: 10:26 by: LBH Run ID: 110698CV
↳Method: CVAAS, USEPA 245.1; Quantitation Limit=0.20 ug/l

Mercury, Total ——— < 0.20 ug/l
↳Analysis Date: 11/06/98 Time: 10:20 by: LBH Run ID: 110698CV
↳Method: CVAAS, USEPA 245.1; Quantitation Limit=0.20 ug/l

Nickel ——— 6.44 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Nickel, Dissolved ——— 5.05 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Silver ——— < 2.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=2.00 ug/l

REPORT CONTINUED ON NEXT PAGE

SAMPLE ANALYSIS DATA

CLIENT ID: FAS ▪ LAB ID: 234854 (continued)

Silver, Dissolved — < 2.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=2.00 ug/l

Trivalent Chromium — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Trivalent Chromium, Dissolved — < 5.00 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Zinc — 36.8 ug/l
↳Analysis Date: 11/10/98 Time: 10:28 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

Zinc, Dissolved — 34.4 ug/l
↳Analysis Date: 11/10/98 Time: 10:31 by: JW Run ID: 111098TR
↳Method: ICP, USEPA 200.7; Quantitation Limit=5.00 ug/l

ROUTINE LABORATORY RESULTS:

Hardness — 158 mg/l
↳Analysis Date: 11/11/98 Time: 14:42 by: LAF Run ID: HRD111198
↳Method: Titrimetric, USEPA 130.2; Quantitation Limit=1 mg/l

Hexavalent Chromium, Dissolved — < 0.010 mg/l
↳Analysis Date: 11/05/98 Time: 11:16 by: LAF Run ID: CR6110598
↳Method: Colorimetric, SM 3500Cr D; Quantitation Limit=0.010 mg/l

Hexavalent Chromium, Total — < 0.010 mg/l
↳Analysis Date: 11/05/98 Time: 11:14 by: LAF Run ID: CR6110598
↳Method: Colorimetric, SM 3500Cr D; Quantitation Limit=0.010 mg/l

Quality Assurance performed on the above data is presented on the following page(s).

If we may be of further assistance, please contact us at any time.

Sincerely,
Q BioChem, L.L.C.

Cheryl M. Daniel, Laboratory Manager

Attachment J

Effluent Water Quality Data for Existing Baseline Antidegradation Calculations

- Effluent Dissolved Metals Data Summary (1994-1997)
- Effluent Chloride Data Summary (1997-1998)
- Effluent Water Quality Lab Data Reports

Western Virginia Water Authority WPCP
VA0025020

Effluent Dissolved Metals Data (µg/L)

	3/24/94	4/12/94*	5/13/94	6/15/94	7/12/94	8/94	9/94	10/19/94	11/15/94	12/9/94	1/95	2/95	8/2/95	11/21/95	6/25/96	12/12/96	5/13/97	10/30/97	5/20/98	** 5/17/94	** 4/3/95	** 5/13/97
As	<1	~~<2~~	<2	3	<2	11	<2	<2	<2	<2	2	<2	<5	<2	<5	<2	<2	<2	<2	<1	<2	<5
Cd	0.14	~~<5~~	0.1	0.2	0.2	<0.1	0.6	0.2	1	0.5	0.2	0.1	0.6	<1	<0.5	2	<1	<1	<1	0.1	<10	0.7
CN										<5				90			<20		<20	<20	<20	
Cr III	<7	~~59~~	2	3	<1	3	<1	<1	<1	1	3.6	1.6	<1	<5	<10	<5	<5	<5	<5	3	<10	<10
Cr VI	<10	~~<10~~	<10	<10	<50	<10	<10	<10	<1	<50	<10	<10	<10	<10	<10	800	<10	<10	<10	11	<10	<10
Cu	<10	~~50~~	2	3	1	4	8	8	<1	5	8.1	2.5	5	<10	<10	<30	<5	<5	<30	3	<10	<10
Pb	1.4	~~2~~	1	3	1	3	5	4	4	2	7.8	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	1.1
Hg	<0.2	~~0.4~~	0.1	0.2	<0.1	0.2	0.3	<0.1	<0.1	0.3	<1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2
Ni	<12	~~93~~	<40	18	5	6	11	9	<10	5	3	4	9	10	5.2	<10	<40	<40	<40	4	<20	52
Se	<2	~~6~~	7	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<2	<1	2	7
Ag	<0.1	~~104~~	1.2	2.2	<0.5	0.6	4.2	3.1	5.4	3	1.5	<0.5	<0.5	<0.2	<2	<0.2	<0.2	<0.2	<0.2	0.4	10	<2
Zn	47	~~53~~	38	31	26	17	50	48	30	1.4	39	<10	<10	20	19.8	40	40	20	10	20	<10	56.6

* Data for 4/12/94 not used due to extreme outliers
** toxicity testing data

Water Chemistry inc.
3404 Aerial Way Drive • Roanoke, VA 24018
Phone (540) 343-3618 • Fax (540) 342-2054

Environmental Services Division

Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46718 p.2
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0800
Collected By: M. Sensabuagh
Collection Method: Composite
Sample Description: FAS

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

Project Name: WPCP FAS
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46718 p.2

Parameter	Result	MDL	Method	Date	Analyst
Dissolved Arsenic	<0.002 mg/L	0.002 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Dissolved Cadmium	<0.001 mg/L	0.001 mg/L	SM 3113B	05/16/97	C. EASTER
Dissolved Chromium	<0.005 mg/L	0.005 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Dissolved Copper	<0.005 mg/L	0.005 mg/L	SM 3113B	05/16/97	C. EASTER
Dissolved Lead	<0.001 mg/L	0.001 mg/L	SM 3113B	05/15/97	C. EASTER
Dissolved Mercury	<0.0002 mg/L	0.0002 mg/L	SM 3112B	05/21/97	M. HILGER
Dissolved Nickel	<0.04 mg/L	0.04 mg/L	SM 3111B	05/15/97	C. EASTER
Dissolved Selenium	<0.002 mg/L	0.002 mg/L	SM 3113B	05/22/97	R. PHILLIPS
Dissolved Silver	<0.0002 mg/L	0.0002 mg/L	SM 3113B	05/19/97	R. PHILLIPS
Dissolved Zinc	0.04 mg/L	0.01 mg/L	SM 3111B	05/15/97	C. EASTER

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423 Maryland #183

D. C. Cram

Environmental Testing Consultants

Water Chemistry inc.
3404 Aerial Way Drive • Roanoke, VA 24018
Phone (540) 343-3618 • Fax (540) 342-2054

Environmental Services Division

Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46718
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0800
Collected By: M. Sensabuagh
Collection Method: Composite
Sample Description: FAS

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

DEQ-WCRO
JUN 13 1997
RECEIVED

Project Name: WPCP FAS
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46718

Parameter	Result	MDL	Method	Date	Analyst
Total Arsenic	<0.002 mg/L	0.002 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Total Cadmium	<0.001 mg/L	0.001 mg/L	SM 3113B	05/16/97	C. EASTER
Total Chromium	<0.005 mg/L	0.005 mg/L	SM 3113B	05/20/97	R. PHILLIPS
Total Copper	<0.005 mg/L	0.005 mg/L	SM 3113B	05/16/97	C. EASTER
Total Lead	<0.001 mg/L	0.001 mg/L	SM 3113B	05/15/97	C. EASTER
Total Mercury	<0.0002 mg/L	0.0002 mg/L	SM 3112B	05/21/97	M. HILGER
Total Nickel	<0.04 mg/L	0.04 mg/L	SM 3111B	05/15/97	C. EASTER
Total Selenium	<0.002 mg/L	0.002 mg/L	SM 3113B	05/22/97	R. PHILLIPS
Total Silver	<0.0002 mg/L	0.0002 mg/L	SM 3113B	05/19/97	R. PHILLIPS
Total Zinc	0.04 mg/L	0.01 mg/L	SM 3111B	05/15/97	C. EASTER
Hardness	152 mg$CaCO_3$/L	4.0 mg$CaCO_3$/L	SM 2340C	05/19/97	J. MORRIS
	8.89 gr$CaCO_3$/gal	0.23 gr$CaCO_3$/gal	WCI	05/19/97	J. MORRIS

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423 Maryland #183

W. C. Cau

Water Chemistry inc.
3404 Aerial Way Drive • Roanoke, VA 24018
Phone (540) 343-3618 • Fax (540) 342-2054

Environmental Services Division

Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46719
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0935
Collected By: M. Sensabuagh
Collection Method: Grab
Sample Description: FAS

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

Project Name: WPCP FAS
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46719

Parameter	Result	MDL	Method	Date	Analyst
Hexachromium	<0.01 mg/L	0.01 mg/L	EPA 218.4	05/14/97	C. EASTER

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423 Maryland #183

D. C. Cave

Environmental Testing, Consultation

Water Chemistry inc.
3404 Aerial Way Drive • Roanoke, VA 24018
Phone (540) 343-3618 • Fax (540) 342-2054

Environmental Services Division
Laboratories and Consultants

Date Reported: May 23, 1997
Sample Code: 46720
Client Code: 1018
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, S.E.
Roanoke VA 24014-2697

Chain of Custody Information

Date Collected: May 13, 1997
Time Collected: 0935
Collected By: M. Sensabaugh
Collection Method: Grab
Sample Description: FAS

Date Received: May 13, 1997
Time Received: 1120
Sample Type: Waste Water

Project Name: WPCP FAS
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 46720

Parameter	Result	MDL	Method	Date	Analyst
Cyanide	<0.02 mg/L	0.02 mg/L	EPA 335.2	05/15/97	M. HILGER

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423 Maryland #183

D. C. Crew

JOHNSTON LABORATORIES, INC.
Environmental Testing
WATER • AIR • SOIL

ORIGINAL

FINAL REPORT OF ANALYSES

City of Roanoke
1402 Bennington Street SE
Roanoke, VA 24014-
Attn: Chris S. Karageorge

REPORT DATE: 06/17/97

SAMPLE NUMBER- 21945 SAMPLE ID- F.A.S. OUTFALL 001 SAMPLE MATRIX- WW
DATE SAMPLED- 05/13/97 LOCATION- Outfall 001 TIME SAMPLED- 0700
DATE RECEIVED- 05/15/97 SAMPLER- CK RECEIVED BY- TLB
TIME RECEIVED- 1200 DELIVERED BY- UPS

ANALYSIS	METHOD	SAMPLE PREP DATE	BY	ANALYSIS DATE	BY	RESULT	UNITS	DET. LIMIT
Chlorine Residual				05/16/97	CSF	0.02	mg/L	0.01
CHLORIDE	EPA 325.3			05/20/97	SAH	72	mg/L	1.0
CYANIDE,TOTAL	EPA 335.2			06/12/97	CSF	<0.006	mg/L	0.006
HARDNESS AS CACO3	CALC.	05/19/97	SAH	05/21/97	RPA	137	mg/L CaCo3	
PH,LAB	EPA150.1			05/16/97	CSF	6.93	std units	
TOTAL DISS.SOLIDS	EPA160.1			05/19/97	DAM	321	mg/L	1
SULFIDE	EPA376.1			05/19/97	CSF	<0.1	mg/L	0.1
ORGANOCHLORINE PESTICIDE & PCB	EPA 608	04/24/97	BB	06/03/97	LOA			
ALDRIN	EPA 608					<0.075	ug/L	0.075
ALPHA BHC	EPA 608					<0.075	ug/L	0.075
BETA-BHC	EPA 608					<0.075	ug/L	0.075
DELTA-BHC	EPA 608					<0.075	ug/L	0.075
GAMMA-BHC	EPA 608					<0.025	ug/L	0.025
CHLORDANE	EPA 608					<0.4	ug/L	0.4
4,4'-DDD	EPA 608					<1.0	ug/L	1.0
4,4'-DDE	EPA 608					<1.0	ug/L	1.0
4,4'-DDT	EPA 608					<1.0	ug/L	1.0
DIELDRIN	EPA 608					<0.025	ug/L	0.025
ENDOSULFAN I	EPA 608					<0.05	ug/L	0.05
ENDOSULFAN II	EPA 608					<0.05	ug/L	0.05
ENDOSULFAN SULFATE	EPA 608					<0.05	ug/L	0.05

JUN 1997
RECEIVED
WATER POLLUTION
CONTROL PLANT

608 MARKET STREET • NEW CUMBERLAND, PA 17070 • PHONE (717) 774-2120 • FAX (717) 774-3865

PA DEP ID: 21-052 NY ID: 11-300

JOHNSTON LABORATORIES, INC.
Environmental Testing
WATER • AIR • SOIL

JUL 1998
RECEIVED
WATER POLLUTION CONTROL PLANT

FINAL REPORT OF ANALYSES

City of Roanoke
1402 Bennington Street SE
Roanoke, VA 24014-
Attn: Biological Mon. Inc.

REPORT DATE: 06/17/98

SAMPLE NUMBER- 37944 SAMPLE ID- CITY OF ROANOKEFAS-001 COMP. SAMPLE MATRIX- WA
DATE SAMPLED- 05/20/98 LOCATION- Outfall 001 TIME SAMPLED- 1430
DATE RECEIVED- 05/21/98 SAMPLER- CK RECEIVED BY- TLB
TIME RECEIVED- 1000 DELIVERED BY- FED EX

ANALYSIS	METHOD	SAMPLE PREP DATE	BY	ANALYSIS DATE	BY	RESULT	UNITS	DET. LIMIT
Chlorine Residual				05/28/98	JLA	<.01	mg/L	.01
CHLORIDE	EPA 325.3			05/22/98	SAH	70	mg/L	1.0
CYANIDE,TOTAL	EPA 335.2			05/22/98	CSF	<0.003	mg/L	0.003
HARDNESS AS CACO3	CALC.	06/01/98	SAH	06/09/98	RPA	148	mg/L CaCo3	
TOTAL DISS.SOLIDS	EPA160.1			05/27/98	JLS	329	mg/L	1.0
ORGANOCHLORINE PESTICIDE & PCB	EPA 608	06/01/98	WRH	06/01/98	LOA			
ALDRIN	EPA 608					< 0.075	ug/L	0.075
ALPHA BHC	EPA 608					< 0.075	ug/L	0.075
BETA-BHC	EPA 608					< 0.075	ug/L	0.075
DELTA-BHC	EPA 608					< 0.075	ug/L	0.075
GAMMA-BHC	EPA 608					< 0.025	ug/L	0.025
CHLORDANE	EPA 608					< 0.4	ug/L	0.4
4,4'-DDD	EPA 608					< 1.0	ug/L	1.0
4,4'-DDE	EPA 608					< 1.0	ug/L	1.0
4,4'-DDT	EPA 608					< 1.0	ug/L	1.0
DIELDRIN	EPA 608					< 0.025	ug/L	0.025
ENDOSULFAN I	EPA 608					< 0.05	ug/L	0.05
ENDOSULFAN II	EPA 608					< 0.05	ug/L	0.05
ENDOSULFAN SULFATE	EPA 608					< 0.05	ug/L	0.05
ENDRIN	EPA 608					< 0.05	ug/L	0.05
ENDRIN ALDEHYDE	EPA 608					< 0.05	ug/L	0.05

Water Chemistry inc.
3404 Aerial Way Drive • Roanoke, VA 24018
Phone (540) 343-3618 • Fax (540) 342-2054

Environmental Services Division
Laboratories and Consultants

Date Reported: June 12, 1998
Sample Code: 98-1889
Prepared By: T. Rakes

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, SE
Roanoke VA 24014

Chain of Custody Information

Date Collected: May 20, 1998
Time Collected: 0905
Collected By: Client
Collection Method: Grab
Sample Description: FAS

Date Received: May 20, 1998
Time Received: 1240
Sample Type: Waste Water

Project Name: FAS
Analytical Notes:

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 98-1889

Parameter	Result	MDL	Method	Date	Analyst
Hexavalent Chromium	<0.01 mg/L	0.01 mg/L	SM 3111B	05/21/98	RMP
Cyanide	<0.02 mg/L	0.02 mg/L	EPA 335.2	05/29/98	KLC

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423

Environmental Testing, Consulting, and Field Services

JTH # 91848
9-10-98 orig CT

Water Chemistry inc.

3404 Aerial Way Drive • Roanoke, VA 24018
Phone (540) 343-3618 • Fax (540) 342-2054

Environmental Services Division

Laboratories and Consultants

Date Reported: June 12, 1998
Sample Code: 98-1888
Prepared By: T. Rakes

RECEIVED JUL 10 98 DEQ-WCRO

Roanoke Regional Water Pollution Control Plant
Attention: Marty Sensabaugh
1402 Bennington Street, SE
Roanoke VA 24014

Chain of Custody Information

Date Collected: May 20, 1998
Time Collected: 0700
Collected By: Client
Collection Method: Composite
Sample Description: Total Recoverable Metals FAS
Project Name: FAS
Analytical Notes:

Date Received: May 20, 1998
Time Received: 1240
Sample Type: Waste Water

cc: TB Permit

Project Notes: MDL=Minimum Detection Level

Analytical Data and Quality Assurance Information

Sample Code: 98-1888

Parameter	Result	MDL	Method	Date	Analyst
Arsenic	<0.002 mg/L	0.002 mg/L	SM 3113B	06/12/98	RMP
Cadmium	<0.001 mg/L	0.001 mg/L	SM 3113B	06/03/98	RMP
Chromium	<0.005 mg/L	0.005 mg/L	SM 3113B	06/03/98	RMP
Copper	<0.03 mg/L	0.03 mg/L	SM 3111B	06/05/98	RMP
Lead	<0.001 mg/L	0.001 mg/L	SM 3113B	06/03/98	RMP
Mercury	<0.0002 mg/L	0.0002 mg/L	SM 3112B	05/20/98	RMP
Nickel	<0.04 mg/L	0.04 mg/L	SM 3111B	06/09/98	RMP
Selenium	<0.002 mg/L	0.002 mg/L	SM 3113B	06/12/98	RMP
Silver	<0.0002 mg/L	0.0002 mg/L	SM 3113B	06/04/98	RMP
Zinc	0.02 mg/L	0.01 mg/L	SM 3111B	06/05/98	RMP
Hardness	410.2 mg$CaCO_3$/L	5.1 mg$CaCO_3$/L	SM 2340C	06/08/98	KLC
	24.0 gr$CaCO_3$/gal	0.3 gr$CaCO_3$/gal	WCI	06/08/98	KLC

Analytical data meet precision and accuracy criteria established by the U.S.E.P.A. for drinking water, waste water, and solid wastes. Exceptions are noted in the analytical notes section of the certificate of analysis. Handling, preservation and collection of samples are performed according to E.P.A. protocol and 40 CFR part 136 and amendments.

Laboratory Certification No: Virginia #0423

Environmental Testing, Consulting, and Field Services

Attachment K

Existing Instream Conditions Determinations

- Instream Expected Value Determinations (STATS Program)
- Effluent Expected Value Determinations (STATS Program)
- Background Roanoke River Water Quality Calculations (Prior to 55 MGD Facility Upgrade)

10/23/2008 11:46:25 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = chloride (mg/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 2
Expected Value = 71
Variance = 1814.76
C.V. = 0.6
97th percentile daily values = 172.772
97th percentile 4 day average = 118.129
97th percentile 30 day average= 85.6297
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

70
72

10/27/2008 9:09:32 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved arsenic (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 1
# samples/mo. = 3
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = .656565
Variance = .155188
C.V. = 0.6
97th percentile daily values = 1.59769
97th percentile 4 day average = 1.09238
97th percentile 30 day average= .791852
< Q.L. = 18
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

11
0
0
0
0
2
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
3

10/27/2008 9:06:45 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved cadmium (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = .352513
Variance = .259166
C.V. = 1.444154
97th percentile daily values = 1.61497
97th percentile 4 day average = .891829
97th percentile 30 day average= .515261
< Q.L. = 7
Model used = delta lognormal

No Limit is required for this material

The data are:

0.14
0.1
0.2
0.2
0
0.6
0.2
1
0.5
0.2
0.1
0.6
0
0
2
0
0
0
0.1
0
0.7

10/27/2008 9:22:20 AM

Facility = WVWA WPCP (35MGD) expected value
Chemical = cyanide (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 6
Expected Value = 3.43516
Variance = 4.24812
C.V. = 0.6
97th percentile daily values = 8.35918
97th percentile 4 day average = 5.71538
97th percentile 30 day average= 4.14298
< Q.L. = 5
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
90
0
0
0
0

10/27/2008 9:23:48 AM

Facility = WVWA WPCP (35MGD) expected value
Chemical = chromium III (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = .927748
Variance = .309858
C.V. = 0.6
97th percentile daily values = 2.25760
97th percentile 4 day average = 1.54357
97th percentile 30 day average= 1.11891
< Q.L. = 14
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
2
3
0
3
0
0
0
1
3.6
1.6
0
0
0
0
0
0
0
3
0
0

10/23/2008 10:31:37 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = chromium VI (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 20
Expected Value = .468400
Variance = .078983
C.V. = 0.6
97th percentile daily values = 1.13981
97th percentile 4 day average = .779320
97th percentile 30 day average= .564915
< Q.L. = 19
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0
0
0
0
0
0
0
0
0
0
0
0
0
11
0
0
0
0
0

10/27/2008 8:56:39 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved copper (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = 2.94101
Variance = 9.68443
C.V. = 1.058131
97th percentile daily values = 10.5329
97th percentile 4 day average = 5.68923
97th percentile 30 day average= 3.82451
< Q.L. = 10
Model used = delta lognormal

No Limit is required for this material

The data are:

0
2
3
1
4
8
8
0
5
8.1
2.5
5
0
0
0
0
0
3
0
0
0

10/27/2008 8:59:05 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved lead (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = 2.11472
Variance = 4.47837
C.V. = 1.000703
97th percentile daily values = 7.62507
97th percentile 4 day average = 4.02049
97th percentile 30 day average= 2.71552
< Q.L. = 11
Model used = delta lognormal

No Limit is required for this material

The data are:

1.4
0
3
1
3
5
4
4
2
7.8
0
0
0
0
0
0
0
0
0
0
1.1

10/23/2008 10:36:47 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved mercury (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = .078827
Variance = .002236
C.V. = 0.6
97th percentile daily values = .191819
97th percentile 4 day average = .131152
97th percentile 30 day average= .095069
< Q.L. = 16
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0.1
0.2
0
0.2
0.3
0
0
0.3
0
0
0
0
0
0
0
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0
0
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0

10/23/2008 10:40:01 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved nickel (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = 7.09557
Variance = 66.8058
C.V. = 1.151912
97th percentile daily values = 26.7811
97th percentile 4 day average = 14.8923
97th percentile 30 day average= 9.55035
< Q.L. = 8
Model used = delta lognormal

No Limit is required for this material

The data are:

0
0
18
5
6
11
9
0
5
3
4
9
10
5.2
0
0
0
0
4
0
52

10/23/2008 10:41:47 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved selenium (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 1
# samples/mo. = 2
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = .731296
Variance = .192526
C.V. = 0.6
97th percentile daily values = 1.77955
97th percentile 4 day average = 1.21672
97th percentile 30 day average= .881982
< Q.L. = 17
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0
7
5
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
2
7

10/27/2008 9:02:05 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved silver (ug/L)
Chronic averaging period = 4
WLAa = 50
WLAc = 50
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = 1.71602
Variance = 12.5662
C.V. = 2.065758
97th percentile daily values = 9.98093
97th percentile 4 day average = 4.69045
97th percentile 30 day average= 2.72243
< Q.L. = 11
Model used = delta lognormal

No Limit is required for this material

The data are:

0
1.2
2.2
0
0.6
4.2
3.1
5.4
3
1.5
0
0
0
0
0
0
0
0
0.4
10
0

10/27/2008 9:04:36 AM

Facility = WVWA WPCP (35 MGD) expected value
Chemical = dissolved zinc (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 1.4
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 21
Expected Value = 30.9395
Variance = 1325.00
C.V. = 1.176506
97th percentile daily values = 124.008
97th percentile 4 day average = 74.3495
97th percentile 30 day average= 43.4403
< Q.L. = 3
Model used = delta lognormal

No Limit is required for this material

The data are:

47
38
31
26
17
50
48
30
1.4
39
0
0
20
19.8
40
40
20
10
20
0
56.6

10/28/2008 3:56:52 PM

Facility = Roanoke River expected value
Chemical = ammonia as N (mg/L)
Chronic averaging period = 30
WLAa = 200
WLAc = 200
Q.L. = 0.04
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 75
Expected Value = .044508
Variance = .000490
C.V. = 0.497725
97th percentile daily values = .098788
97th percentile 4 day average = .060625
97th percentile 30 day average= .047912
< Q.L. = 64
Model used = delta lognormal

No Limit is required for this material

The data are:

0.04
0.04
0.07
0.36
0.05
0.04
0.06
0.04
0.06
0.04
0.05
0
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10/27/2008 9:31:57 AM

Facility = Roanoke River expected value
Chemical = dissolved arsenic (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = .607860
Variance = .133017
C.V. = 0.6
97th percentile daily values = 1.47917
97th percentile 4 day average = 1.01135
97th percentile 30 day average= .733111
< Q.L. = 16
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0
2
0
7
0
0
0
0
0
0
0
0
0
0
0
0
0
0

10/27/2008 10:37:49 AM

Facility = Roanoke River expected value
Chemical = dissolved cadmium (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = .108767
Variance = .004258
C.V. = 0.6
97th percentile daily values = .264676
97th percentile 4 day average = .180965
97th percentile 30 day average= .131179
< Q.L. = 10
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0.17
0.3
0
0
0
0.4
0.1
0.2
0.4
0
0.1
0.1
0
0
0
0
0
0

10/23/2008 3:34:22 PM

Facility = Roanoke River expected value
Chemical = chloride (mg/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 66
Expected Value = 10.6064
Variance = 10.7282
C.V. = 0.308811
97th percentile daily values = 17.8788
97th percentile 4 day average = 13.9909
97th percentile 30 day average= 11.7313
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

14.4
9.8
9.5
7.9
7.8
8.4
9.2
8.1
9.3
9.3
9.2
6.9
10.7
7.7
8.4
7.2
7.6
13.4
9
9
9.5
9.1
9.9

10
9.2
8.5
7.5
6.5
5.6
7.3
9.6
10.1
10.2
9.6
11.2
10.3
12.4
24.5
37.9
13.4
7.9
8.85
14
7.1
14.1
10.6
10.9
7.9
17
11.7
11.7
9.4
13.3
13.5
11.8
15.6
6.9
11.2
11.7
11.4
12
11.4
12.1
7.7
10.9
9.9

10/27/2008 9:57:43 AM

Facility = Roanoke River expected value
Chemical = chromium III (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = .844147
Variance = .256530
C.V. = 0.6
97th percentile daily values = 2.05416
97th percentile 4 day average = 1.40448
97th percentile 30 day average= 1.01808
< Q.L. = 13
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

2
0
0
0
0
0
0
0
0
0
0
0
0
0
1
1
1.6
6

10/27/2008 9:33:59 AM

Facility = Roanoke River expected value
Chemical = dissolved copper (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = 1.83849
Variance = 2.51251
C.V. = 0.862167
97th percentile daily values = 6.01001
97th percentile 4 day average = 3.35721
97th percentile 30 day average= 2.31455
< Q.L. = 8
Model used = delta lognormal

No Limit is required for this material

The data are:

0
1
3
1
4
3
1
0
2
0
2.5
1
0
0
0
0
6
0

10/27/2008 9:38:08 AM

Facility = Roanoke River expected value
Chemical = dissolved lead (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 0.5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = 2.05581
Variance = 8.04612
C.V. = 1.379775
97th percentile daily values = 9.20149
97th percentile 4 day average = 4.77785
97th percentile 30 day average= 2.90773
< Q.L. = 8
Model used = delta lognormal

No Limit is required for this material

The data are:

0
3
2
1
5
4
1
13
2
1.5
0
0
0
0
0
0
1
0

10/27/2008 9:58:46 AM

Facility = Roanoke River expected value
Chemical = dissolved mercury (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = .084414
Variance = .002565
C.V. = 0.6
97th percentile daily values = .205416
97th percentile 4 day average = .140448
97th percentile 30 day average= .101808
< Q.L. = 13
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0
0
0
0
0
0
0
0
0
0
0
0
0.1
0.1
0.2
0.1
0.4

10/27/2008 9:53:16 AM

Facility = Roanoke River expected value
Chemical = dissolved nickel (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = .998867
Variance = .359185
C.V. = 0.6
97th percentile daily values = 2.43066
97th percentile 4 day average = 1.66190
97th percentile 30 day average= 1.20468
< Q.L. = 11
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0
14
1
5
1
1
0
0
4
1
0
0
0
0
0
0
0
0

10/27/2008 10:25:43 AM

Facility = Roanoke River expected value
Chemical = dissolved selenium (ug/)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 19
Expected Value = .984739
Variance = .349096
C.V. = 0.6
97th percentile daily values = 2.39628
97th percentile 4 day average = 1.63839
97th percentile 30 day average= 1.18764
< Q.L. = 18
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

2
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0

10/27/2008 9:51:34 AM

Facility = Roanke River expected value
Chemical = dissolved silver (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = .108767
Variance = .004258
C.V. = 0.6
97th percentile daily values = .264676
97th percentile 4 day average = .180965
97th percentile 30 day average= .131179
< Q.L. = 10
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0
0.7
1.6
0
0.6
2.8
2.3
11
1.8
1.1
0
0
0
0
0
0
0
0

10/27/2008 9:36:37 AM

Facility = Roanoke River expected value
Chemical = dissolved zinc (ug/L)
Chronic averaging period = 4
WLAa = 200
WLAc = 200
Q.L. = 0.4
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 18
Expected Value = .466476
Variance = .078336
C.V. = 0.6
97th percentile daily values = 1.13513
97th percentile 4 day average = .776118
97th percentile 30 day average= .562595
< Q.L. = 9
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

14.8
33
0
0
11
15
0
0
0.4
0
0
0
10
0
0
10
60
10

WVWA WPCP
VA0025020

Antidegradation Background Calculations
(35 MGD facility prior to expansion)

Low flow stream flows given when facility was 35 MGD prior to expansion to 42 MGD
Effluent data collected from 1994 - 1997 used to calculate expected effluent concentration
Upstream data collected from 1994 through 1998 used to calculate expected upstream concentration
Background stream concentration prior to 42 MGD upgrade = effluent concentration + upstream concentration
Existing stream concentrations determined during acute and chronic flow conditions.

Qex=(QsCs + QeCe)/(Qs+Qe)

Parameter dissolved zinc

Expected Value stream	0.466476	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	30.9395	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**19.31**	ug/L
chronic	**18.45**	ug/L
human health	**15.75**	ug/L

Parameter dissolved copper

Expected Value stream	1.83849	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	2.94101	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**2.52**	ug/L
chronic	**2.49**	ug/L
human health	**2.39**	ug/L

Parameter dissolved lead

Expected Value stream	2.05581	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	2.11472	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**2.09**	ug/L
chronic	**2.09**	ug/L
human health	**2.09**	ug/L

WVWA WPCP
VA0025020

Antidegradation Background Calculations
(35 MGD facility prior to expansion)

Parameter dissolved mercury

Expected Value stream	0.084414	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	0.078827	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**0.081**	ug/L
chronic	**0.081**	ug/L
human health	**0.082**	ug/L

Parameter dissolved silver

Expected Value stream	0.108767	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	1.71602	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**1.103**	ug/L
chronic	**1.057**	ug/L
human health	**0.915**	ug/L

Parameter hexavalent chromium

Expected Value stream	0	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	0.4684	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**0.290**	ug/L
chronic	**0.276**	ug/L
human health	**0.235**	ug/L

WVWA WPCP
VA0025020

Antidegradation Background Calculations
(35 MGD facility prior to expansion)

Parameter dissolved selenium

Expected Value stream	0.984739	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	0.731296	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**0.828**	ug/L
chronic	**0.835**	ug/L
human health	**0.858**	ug/L

Parameter chloride

Expected Value stream	10606.4	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	71000	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**47952.27**	ug/L
chronic	**46251.86**	ug/L
human health	**40889.72**	ug/L

Parameter dissolved nickel

Expected Value stream	0.998867	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	7.09557	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**4.77**	ug/L
chronic	**4.60**	ug/L
human health	**4.06**	ug/L

WVWA WPCP
VA0025020

Antidegradation Background Calculations
(35 MGD facility prior to expansion)

Parameter dissolved arsenic

Expected Value stream	0.60786	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	0.656565	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**0.64**	ug/L
chronic	**0.64**	ug/L
human health	**0.63**	ug/L

Parameter dissolved cadmium

Expected Value stream	0.108767	ug/L	Effluent Design Flow	35 MGD
Expected Value effluent	0.352513	ug/L		

low flow 1Q10	21.6	MGD
low flow 7Q10	24.3	MGD
30Q5	34.8	

Low Flow Conditions

acute	**0.26**	ug/L
chronic	**0.25**	ug/L
human health	**0.23**	ug/L