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Effluent Laboratory Data Sheets (2011, 2012, 2013)

- **Water Quality Standards Monitoring**
- **Clean Metals Monitoring**

(3)

REI Consultants, Inc. - Analytical Report

WO#: 1305V06

Date Reported: 6/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	5/29/2013 2:00:00 PM
Project:	MAY SAMPLING	**Date Received:**	5/29/2013
Lab ID:	1305V06-05A	**Matrix:**	Waste Water
Client Sample ID:	001 - COMP	**Site ID:**	001

Analysis	Result	PQL	MCL	Qual	Units	PrepDate	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	CY		NA				
HARDNESS		**Method: SM2340 B**				**E200.2**	**Analyst: LF**
Hardness, Total (As CaCO3)	188	1.00	NA		mg/L	5/31/2013 11:00 AM	5/31/2013 5:26 PM
SEMIVOLATILE ORGANIC COMPOUNDS		**Method: E625**				**SW3510**	**Analyst: JD**
Acenaphthene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Acenaphthylene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Anthracene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Benzidine	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Benzo(a)anthracene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Benzo(a)pyrene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Benzo(b)fluoranthene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Benzo(g,h,i)perylene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Benzo(k)fluoranthene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Bis(2-chloroethoxy)methane	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Bis(2-chloroethyl)ether	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Bis(2-chloroisopropyl)ether	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Bis(2-ethylhexyl)phthalate	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
4-Bromophenyl phenyl ether	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Butyl benzyl phthalate	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
4-Chloro-3-methylphenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2-Chloronaphthalene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2-Chlorophenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
4-Chlorophenyl phenyl ether	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Chrysene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
o-Cresol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
m,p-Cresol	ND	0.0204	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Dibenzo(a,h)anthracene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Di-n-butyl phthalate	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
1,2-Dichlorobenzene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
1,3-Dichlorobenzene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
1,4-Dichlorobenzene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
3,3'-Dichlorobenzidine	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2,4-Dichlorophenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Diethyl phthalate	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Dimethyl phthalate	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2,4-Dimethylphenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
4,6-Dinitro-2-methylphenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2,4-Dinitrophenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/7/2013 7:02 PM

REI Consultants, Inc. - Analytical Report

WO#: 1305V06

Date Reported: 6/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	5/29/2013 2:00:00 PM
Project:	MAY SAMPLING	**Date Received:**	5/29/2013
Lab ID:	1305V06-05A	**Matrix:**	Waste Water
Client Sample ID:	001 - COMP	**Site ID:**	001

Analysis	Result	PQL	MCL	Qual	Units	PrepDate	Date Analyzed
2,4-Dinitrotoluene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2,6-Dinitrotoluene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Di-n-octyl phthalate	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
1,2-Diphenylhydrazine	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Fluoranthene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Fluorene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Hexachlorobenzene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Hexachlorobutadiene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Hexachlorocyclopentadiene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Hexachloroethane	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Indeno(1,2,3-cd)pyrene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Isophorone	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Naphthalene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Nitrobenzene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2-Nitrophenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
4-Nitrophenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
N-Nitrosodimethylamine	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
N-Nitrosodiphenylamine	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
N-Nitrosodi-n-propylamine	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Pentachlorophenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Phenanthrene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Phenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Pyrene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
1,2,4-Trichlorobenzene	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
2,4,6-Trichlorophenol	ND	0.0102	NA		mg/L	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Surr: 2-Fluorophenol	47.3	25.9-110	NA		%REC	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Surr: Phenol-d5	35.9	8.2-110	NA		%REC	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Surr: 2,4,6-Tribromophenol	95.7	61.7-110	NA		%REC	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Surr: Nitrobenzene-d5	90.1	62.2-110	NA		%REC	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Surr: 2-Fluorobiphenyl	81.6	54.6-110	NA		%REC	6/3/2013 10:43 AM	6/6/2013 12:37 AM
Surr: 4-Terphenyl-d14	83.0	10.7-110	NA		%REC	6/3/2013 10:43 AM	6/6/2013 12:37 AM
ANIONS by ION CHROMATOGRAPHY		**Method: SM4110B**					**Analyst: CF**
Nitrogen, Nitrate-Nitrite	12.1	1.00	NA		mg/L		5/30/2013 9:15 PM
AMMONIA NITROGEN		**Method: EPA350.1**					**Analyst: AL**
Nitrogen, Ammonia (As N)	ND	0.10	NA		mg/L		5/30/2013 3:28 PM
TOTAL DISSOLVED SOLIDS		**Method: SM2540 C**					**Analyst: SF**
Total Dissolved Solids	349	10	NA		mg/L		5/31/2013 2:56 PM

REI Consultants, Inc. - Analytical Report

WO#: 1306V19

Date Reported: 7/3/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	6/27/2013 2:50:00 PM
Project:	JUNE SAMPLING	**Date Received:**	6/27/2013
Lab ID:	1306V19-04A	**Matrix:**	Waste Water
Client Sample ID:	001 - GRAB 4	**Site ID:**	001

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	MV			NA			
pH, SM4500H+ B	7.29			NA		S.U.	
ACROLEIN BY E624		**Method: E624**					**Analyst: RB**
Acrolein	ND	5.0	10	NA		µg/L	6/28/2013 6:56 PM
VOLATILE ORGANIC COMPOUNDS		**Method: E624**					**Analyst: RB**
Benzene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Bromodichloromethane	4.3	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Bromoform	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Bromomethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Carbon tetrachloride	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Chlorobenzene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Chloroethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Chloroform	12.5	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Chloromethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Dibromochloromethane	1.2	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,2-Dichlorobenzene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,3-Dichlorobenzene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,4-Dichlorobenzene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,1-Dichloroethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,2-Dichloroethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,1-Dichloroethene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
trans-1,2-Dichloroethene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,2-Dichloropropane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
cis-1,3-Dichloropropene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
trans-1,3-Dichloropropene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Ethylbenzene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Methylene chloride	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,1,2,2-Tetrachloroethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Tetrachloroethene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Toluene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,1,1-Trichloroethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
1,1,2-Trichloroethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Trichloroethene	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Trichlorofluoromethane	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Vinyl chloride	ND	0.5	1.0	NA		µg/L	6/28/2013 6:56 PM
Surr: 1,2-Dichloroethane-d4	84.1	NA	73.2-133	NA		%REC	6/28/2013 6:56 PM
Surr: Toluene-d8	107	NA	71-132	NA		%REC	6/28/2013 6:56 PM

REI Consultants, Inc. - Analytical Report

WO#: 1306V19

Date Reported: 7/3/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	6/27/2013 2:50:00 PM
Project:	JUNE SAMPLING	**Date Received:**	6/27/2013
Lab ID:	1306V19-04A	**Matrix:**	Waste Water
Client Sample ID:	001 - GRAB 4	**Site ID:**	001

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Surr: 4-Bromofluorobenzene	103	NA	74.2-129	NA		%REC	6/28/2013 6:56 PM
VOLATILE ORGANIC COMPOUNDS-624		**Method: E624**					**Analyst: RB**
2-Chloroethyl vinyl ether	ND	2.5	5.0	NA		µg/L	6/28/2013 6:56 PM
Acrylonitrile	ND	5.0	10	NA		µg/L	6/28/2013 6:56 PM
4-Methyl-2-pentanone	ND	5.0	10	NA		µg/L	6/28/2013 6:56 PM
Surr: 1,2-Dichloroethane-d4	84.1	NA	73.2-133	NA		%REC	6/28/2013 6:56 PM
Surr: Toluene-d8	107	NA	71-132	NA		%REC	6/28/2013 6:56 PM
Surr: 4-Bromofluorobenzene	103	NA	74.2-129	NA		%REC	6/28/2013 6:56 PM
OIL and GREASE		**Method: EPA1664A**					**Analyst: MC**
Oil & Grease	ND	2.0	5.0	NA		mg/L	7/3/2013 9:00 AM
PHENOLICS		**Method: E420.1**					**Analyst: BA**
Phenolics	ND	0.005	0.010	NA		mg/L	7/2/2013 12:00 PM
Cyanide		**Method: E335.4**					**Analyst: AL**
Cyanide, Total	ND	0.005	0.020	NA		mg/L	6/28/2013 11:23 AM

REI Consultants, Inc. - Analytical Report

WO#: 1307S63

Date Reported: 8/8/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	7/29/2013 1:15:00 PM
Project:	001 GRABS AND COMP	**Date Received:**	7/29/2013
Lab ID:	1307S63-04A	**Matrix:**	Waste Water
Client Sample ID:	001 GRAB 4	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	MV			NA			
ACROLEIN BY E624		**Method: E624**					**Analyst: RB**
Acrolein	ND	5.0	10	NA		µg/L	7/30/2013 5:14 PM
VOLATILE ORGANIC COMPOUNDS		**Method: E624**					**Analyst: RB**
Benzene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Bromodichloromethane	4.5	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Bromoform	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Bromomethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Carbon tetrachloride	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Chlorobenzene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Chloroethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Chloroform	11.9	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Chloromethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Dibromochloromethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,2-Dichlorobenzene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,3-Dichlorobenzene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,4-Dichlorobenzene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,1-Dichloroethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,2-Dichloroethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,1-Dichloroethene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
trans-1,2-Dichloroethene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,2-Dichloropropane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
cis-1,3-Dichloropropene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
trans-1,3-Dichloropropene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Ethylbenzene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Methylene chloride	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,1,2,2-Tetrachloroethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Tetrachloroethene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Toluene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,1,1-Trichloroethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
1,1,2-Trichloroethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Trichloroethene	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Trichlorofluoromethane	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Vinyl chloride	ND	0.5	1.0	NA		µg/L	7/30/2013 5:14 PM
Surr: 1,2-Dichloroethane-d4	98.3	NA	73.2-133	NA		%REC	7/30/2013 5:14 PM
Surr: Toluene-d8	100	NA	71-132	NA		%REC	7/30/2013 5:14 PM
Surr: 4-Bromofluorobenzene	99.9	NA	74.2-129	NA		%REC	7/30/2013 5:14 PM

REI Consultants, Inc. - Analytical Report

WO#: 1307S63

Date Reported: 8/8/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	7/29/2013 1:15:00 PM
Project:	001 GRABS AND COMP	**Date Received:**	7/29/2013
Lab ID:	1307S63-04A	**Matrix:**	Waste Water
Client Sample ID:	001 GRAB 4	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
VOLATILE ORGANIC COMPOUNDS-624		**Method: E624**					**Analyst: RB**
2-Chloroethyl vinyl ether	ND	2.5	5.0	NA		µg/L	7/30/2013 5:14 PM
Acrylonitrile	ND	5.0	10	NA		µg/L	7/30/2013 5:14 PM
4-Methyl-2-pentanone	ND	5.0	10	NA		µg/L	7/30/2013 5:14 PM
Surr: 1,2-Dichloroethane-d4	98.3	NA	73.2-133	NA		%REC	7/30/2013 5:14 PM
Surr: Toluene-d8	100	NA	71-132	NA		%REC	7/30/2013 5:14 PM
Surr: 4-Bromofluorobenzene	99.9	NA	74.2-129	NA		%REC	7/30/2013 5:14 PM
OIL and GREASE		**Method: EPA1664A**					**Analyst: JJ**
Oil & Grease	ND	2.0	5.0	NA		mg/L	7/30/2013 8:30 AM
PHENOLICS		**Method: E420.1**					**Analyst: BA**
Phenolics	ND	0.005	0.010	NA		mg/L	7/31/2013 11:00 AM
Cyanide		**Method: E335.4**					**Analyst: AL**
Cyanide, Total	ND	0.005	0.020	NA		mg/L	7/31/2013 11:39 AM

REI Consultants, Inc. - Analytical Report

WO#: 1307S63

Date Reported: 8/8/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	7/30/2013 12:30:00 PM
Project:	001 GRABS AND COMP	**Date Received:**	7/29/2013
Lab ID:	1307S63-05A	**Matrix:**	Waste Water
Client Sample ID:	001 COMP	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	MV			NA			
PESTICIDES/PCBS		**Method: E608**			**SW3510B**		**Analyst: NC**
Aroclor 1016	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Aroclor 1221	ND	0.000200	0.000499	NA		mg/L	8/8/2013 6:34 AM
Aroclor 1232	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Aroclor 1242	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Aroclor 1248	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Aroclor 1254	ND	0.000137	0.000499	NA		mg/L	8/8/2013 6:34 AM
Aroclor 1260	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Aldrin	ND	0.000120	0.000499	NA		mg/L	8/8/2013 6:34 AM
alpha-BHC	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
beta-BHC	ND	0.000090	0.000499	NA		mg/L	8/8/2013 6:34 AM
delta-BHC	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
gamma-BHC	ND	0.000110	0.000499	NA		mg/L	8/8/2013 6:34 AM
Chlordane	ND	0.000479	0.00499	NA		mg/L	8/8/2013 6:34 AM
4,4'-DDD	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
4,4'-DDE	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
4,4'-DDT	ND	0.000110	0.000499	NA		mg/L	8/8/2013 6:34 AM
Dieldrin	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Endosulfan I	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Endosulfan II	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Endosulfan sulfate	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Endrin	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Endrin aldehyde	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Heptachlor	ND	0.000100	0.000499	NA		mg/L	8/8/2013 6:34 AM
Heptachlor epoxide	ND	0.000080	0.000499	NA		mg/L	8/8/2013 6:34 AM
Toxaphene	ND	0.000569	0.00499	NA		mg/L	8/8/2013 6:34 AM
Surr: decachlorobiphenyl	41.5	NA	5.3-110	NA		%REC	8/8/2013 6:34 AM
Surr: tetrachloro-m-xylene	87.5	NA	19.49-150	NA		%REC	8/8/2013 6:34 AM

Notes:

The associated batch matrix spike exceeds REIC control limits.

SEMIVOLATILE ORGANIC COMPOUNDS		**Method: E625**			**SW3510**		**Analyst: JD**
Acenaphthene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Acenaphthylene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Anthracene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Benzidine	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Benzo(a)anthracene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Benzo(a)pyrene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM

REI Consultants, Inc. - Analytical Report

WO#: 1307S63

Date Reported: 8/8/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	7/30/2013 12:30:00 PM
Project:	001 GRABS AND COMP	**Date Received:**	7/29/2013
Lab ID:	1307S63-05A	**Matrix:**	Waste Water
Client Sample ID:	001 COMP	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Benzo(b)fluoranthene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Benzo(g,h,i)perylene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Benzo(k)fluoranthene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Bis(2-chloroethoxy)methane	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Bis(2-chloroethyl)ether	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Bis(2-chloroisopropyl)ether	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Bis(2-ethylhexyl)phthalate	ND	0.0070	0.0116	NA		mg/L	8/6/2013 8:34 PM
4-Bromophenyl phenyl ether	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Butyl benzyl phthalate	ND	0.0058	0.0116	NA		mg/L	8/6/2013 8:34 PM
4-Chloro-3-methylphenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2-Chloronaphthalene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2-Chlorophenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
4-Chlorophenyl phenyl ether	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Chrysene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Dibenzo(a,h)anthracene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Di-n-butyl phthalate	ND	0.0035	0.0116	NA		mg/L	8/6/2013 8:34 PM
3,3'-Dichlorobenzidine	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2,4-Dichlorophenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Diethyl phthalate	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Dimethyl phthalate	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2,4-Dimethylphenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
4,6-Dinitro-2-methylphenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2,4-Dinitrophenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2,4-Dinitrotoluene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2,6-Dinitrotoluene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Di-n-octyl phthalate	ND	0.0058	0.0116	NA		mg/L	8/6/2013 8:34 PM
1,2-Diphenylhydrazine	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Fluoranthene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Fluorene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Hexachlorobenzene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Hexachlorobutadiene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Hexachlorocyclopentadiene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Hexachloroethane	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Indeno(1,2,3-cd)pyrene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Isophorone	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Naphthalene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Nitrobenzene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2-Nitrophenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
4-Nitrophenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
N-Nitrosodimethylamine	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
N-Nitrosodiphenylamine	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM

REI Consultants, Inc. - Analytical Report

WO#: 1307S63

Date Reported: 8/8/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	7/30/2013 12:30:00 PM
Project:	001 GRABS AND COMP	**Date Received:**	7/29/2013
Lab ID:	1307S63-05A	**Matrix:**	Waste Water
Client Sample ID:	001 COMP	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
N-Nitrosodi-n-propylamine	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Pentachlorophenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Phenanthrene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Phenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Pyrene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
1,2,4-Trichlorobenzene	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
2,4,6-Trichlorophenol	ND	0.0023	0.0116	NA		mg/L	8/6/2013 8:34 PM
Surr: 2-Fluorophenol	56.2	NA	25.9-110	NA		%REC	8/6/2013 8:34 PM
Surr: Phenol-d5	41.5	NA	8.2-110	NA		%REC	8/6/2013 8:34 PM
Surr: 2,4,6-Tribromophenol	87.4	NA	61.7-110	NA		%REC	8/6/2013 8:34 PM
Surr: Nitrobenzene-d5	89.4	NA	62.2-110	NA		%REC	8/6/2013 8:34 PM
Surr: 2-Fluorobiphenyl	82.6	NA	54.6-110	NA		%REC	8/6/2013 8:34 PM
Surr: 4-Terphenyl-d14	73.8	NA	10.7-110	NA		%REC	8/6/2013 8:34 PM
ANIONS by ION CHROMATOGRAPHY		**Method: E300.0**					**Analyst: CF**
Nitrogen, Nitrate	9.00	0.20	1.00	NA		mg/L	7/31/2013 12:58 PM
Nitrogen, Nitrite	ND	0.05	0.50	NA		mg/L	7/31/2013 12:58 PM
AMMONIA NITROGEN		**Method: EPA350.1**					**Analyst: AL**
Nitrogen, Ammonia (As N)	ND	0.04	0.10	NA		mg/L	7/31/2013 2:32 PM
TOTAL DISSOLVED SOLIDS		**Method: SM2540 C**					**Analyst: SF**
Total Dissolved Solids	346	5	10	500		mg/L	8/1/2013 2:14 PM

REI Consultants, Inc. - Analytical Report

WO#: 1304588

Date Reported: 4/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	4/4/2013 11:35:00 AM
Project:	VPDES PERMIT APPLICATION	**Date Received:**	4/4/2013 8:25:25 PM
Lab ID:	1304588-04A	**Matrix:**	Waste Water
Client Sample ID:	GRAB 4	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	MV	NA		NA			
ACROLEIN BY E624		**Method: E624**					**Analyst: RB**
Acrolein	ND	NA	10	NA		µg/L	4/9/2013 2:46 PM
Notes:							
The holding time was exceeded for Acrolein.							
VOLATILE ORGANIC COMPOUNDS		**Method: E624**					**Analyst: RB**
Benzene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Bromodichloromethane	3.3	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Bromoform	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Bromomethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Carbon tetrachloride	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Chlorobenzene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Chloroethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Chloroform	14.9	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Chloromethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Dibromochloromethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
1,1-Dichloroethene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
trans-1,2-Dichloroethene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
1,2-Dichloropropane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
cis-1,3-Dichloropropene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
trans-1,3-Dichloropropene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Ethylbenzene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Methylene chloride	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
1,1,2,2-Tetrachloroethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Tetrachloroethene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Toluene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
1,1,1-Trichloroethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
1,1,2-Trichloroethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Trichloroethene	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Trichlorofluoromethane	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Vinyl chloride	ND	NA	1.0	NA		µg/L	4/9/2013 2:46 PM
Surr: 1,2-Dichloroethane-d4	109	NA	73.2-133	NA		%REC	4/9/2013 2:46 PM
Surr: Toluene-d8	97.5	NA	71-132	NA		%REC	4/9/2013 2:46 PM
Surr: 4-Bromofluorobenzene	96.7	NA	74.2-129	NA		%REC	4/9/2013 2:46 PM
VOLATILE ORGANIC COMPOUNDS-624		**Method: E624**					**Analyst: RB**
2-Chloroethyl vinyl ether	ND	NA	5.0	NA		µg/L	4/9/2013 2:46 PM
Acrylonitrile	ND	NA	10	NA		µg/L	4/9/2013 2:46 PM
Surr: 1,2-Dichloroethane-d4	109	NA	73.2-133	NA		%REC	4/9/2013 2:46 PM

REI Consultants, Inc. - Analytical Report

WO#: 1304588

Date Reported: 4/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	4/4/2013 11:35:00 AM
Project:	VPDES PERMIT APPLICATION	**Date Received:**	4/4/2013 8:25:25 PM
Lab ID:	1304588-04A	**Matrix:**	Waste Water
Client Sample ID:	GRAB 4	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Surr: Toluene-d8	97.5	NA	71-132	NA		%REC	4/9/2013 2:46 PM
Surr: 4-Bromofluorobenzene	96.7	NA	74.2-129	NA		%REC	4/9/2013 2:46 PM
OIL and GREASE		**Method: E1664A**					**Analyst: MC**
Oil & Grease	ND	NA	5.0	NA		mg/L	4/10/2013 9:00 AM
PHENOLICS		**Method: E420.1**					**Analyst: BA**
Phenolics	ND	NA	0.010	NA		mg/L	4/10/2013 12:30 PM
Cyanide		**Method: E335.4**					**Analyst: JJ**
Cyanide, Total	ND	NA	0.020	NA		mg/L	4/8/2013 10:48 AM

REI Consultants, Inc. - Analytical Report

WO#: 1304588

Date Reported: 4/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	4/4/2013 12:00:00 PM
Project:	VPDES PERMIT APPLICATION	**Date Received:**	4/4/2013 8:25:25 PM
Lab ID:	1304588-05A	**Matrix:**	Waste Water
Client Sample ID:	COMP	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	MV	NA		NA			
HARDNESS		**Method: SM2340 B**			**E200.2**		**Analyst: LF**
Hardness, Total (As CaCO3)	192	NA	1.00	NA		mg/L	4/8/2013 4:40 PM
SEMIVOLATILE ORGANIC COMPOUNDS		**Method: E625**			**SW3510**		**Analyst: JD**
Acenaphthene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Acenaphthylene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Anthracene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Benzidine	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Benzo(a)anthracene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Benzo(a)pyrene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Benzo(b)fluoranthene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Benzo(g,h,i)perylene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Benzo(k)fluoranthene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Bis(2-chloroethoxy)methane	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Bis(2-chloroethyl)ether	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Bis(2-chloroisopropyl)ether	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Bis(2-ethylhexyl)phthalate	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
4-Bromophenyl phenyl ether	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Butyl benzyl phthalate	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
4-Chloro-3-methylphenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2-Chloronaphthalene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2-Chlorophenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
4-Chlorophenyl phenyl ether	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Chrysene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
o-Cresol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
m,p-Cresol	ND	NA	0.0206	NA		mg/L	4/10/2013 12:20 AM
Dibenzo(a,h)anthracene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Di-n-butyl phthalate	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
1,2-Dichlorobenzene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
1,3-Dichlorobenzene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
1,4-Dichlorobenzene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
3,3'-Dichlorobenzidine	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2,4-Dichlorophenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Diethyl phthalate	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Dimethyl phthalate	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2,4-Dimethylphenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
4,6-Dinitro-2-methylphenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2,4-Dinitrophenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM

REI Consultants, Inc. - Analytical Report

WO#: 1304588

Date Reported: 4/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	4/4/2013 12:00:00 PM
Project:	VPDES PERMIT APPLICATION	**Date Received:**	4/4/2013 8:25:25 PM
Lab ID:	1304588-05A	**Matrix:**	Waste Water
Client Sample ID:	COMP	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
2,4-Dinitrotoluene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2,6-Dinitrotoluene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Di-n-octyl phthalate	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
1,2-Diphenylhydrazine	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Fluoranthene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Fluorene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Hexachlorobenzene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Hexachlorobutadiene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Hexachlorocyclopentadiene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Hexachloroethane	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Indeno(1,2,3-cd)pyrene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Isophorone	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Naphthalene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Nitrobenzene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2-Nitrophenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
4-Nitrophenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
N-Nitrosodimethylamine	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
N-Nitrosodiphenylamine	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
N-Nitrosodi-n-propylamine	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Pentachlorophenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Phenanthrene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Phenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Pyrene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
1,2,4-Trichlorobenzene	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
2,4,6-Trichlorophenol	ND	NA	0.0103	NA		mg/L	4/10/2013 12:20 AM
Surr: 2-Fluorophenol	44.9	NA	3.97-110	NA		%REC	4/10/2013 12:20 AM
Surr: Phenol-d5	32.8	NA	19-110	NA		%REC	4/10/2013 12:20 AM
Surr: 2,4,6-Tribromophenol	84.2	NA	74.8-110	NA		%REC	4/10/2013 12:20 AM
Surr: Nitrobenzene-d5	91.6	NA	66.4-110	NA		%REC	4/10/2013 12:20 AM
Surr: 2-Fluorobiphenyl	79.6	NA	64.5-110	NA		%REC	4/10/2013 12:20 AM
Surr: 4-Terphenyl-d14	55.2	NA	72.6-110	NA	S	%REC	4/10/2013 12:20 AM
ANIONS by ION CHROMATOGRAPHY		**Method: SM4110B**					**Analyst: CF**
Nitrogen, Nitrate-Nitrite	9.10	NA	1.00	NA		mg/L	4/5/2013 10:51 AM
AMMONIA NITROGEN		**Method: E350.1**					**Analyst: JJ**
Nitrogen, Ammonia (As N)	ND	NA	0.10	NA		mg/L	4/5/2013 3:50 PM
TOTAL DISSOLVED SOLIDS		**Method: SM2540 C**					**Analyst: SF**
Total Dissolved Solids	359	NA	10	NA		mg/L	4/6/2013 11:16 AM

REI Consultants, Inc. - Case Narrative

WO#: 1305V06

Date Reported: 6/11/2013

Client: WESTERN VA WATER WWTP

Project: MAY SAMPLING

The analytical results presented in this report were produced using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. Verification of required sample preservation (as required) is recorded on associated laboratory logs. Any deviation from compliance or method modification is identified within the body of this report by a qualifier footnote which is defined at the bottom of this page.

All sample results for solid samples are reported on an "as-received" wet weight basis unless otherwise noted.

Results reported for sums of individual parameters, such as TTHM and HAA5, may vary slightly from the sum of the individual parameter results, due to rounding of individual results, as required by EPA.

The test results in this report meet all NELAP (and/or VELAP) requirements for parameters except as noted in this report.

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DEFINITIONS:
MCL: Maximum Contaminant Level
MDL: Method Detection Limit; The lowest concentration of analyte that can be detected by the method in the applicable matrix.
Mg/Kg or mg/L: Units of part per million (PPM) - milligram per Kilogram (weight/weight) or milligram per Liter (weight/volume).
NA: Not Applicable
ND: Not Detected at the PQL or MDL
PQL: Practical Quantitation Limit; The lowest verified limit to which data is quantified without qualifications. Analyte concentrations below PQL are reported either as ND or as a number with a "J" qualifier.
Qual: Qualifier that applies to the analyte reported.
TIC: Tentatively Identified Compound, Estimated Concentration
Ug/Kg or ug/L: Units of part per billion (PPB) - microgram per kilogram (weight/weight) or microgram per liter (weight/volume).

QUALIFIERS:
X: Reported value exceeds required MCL
B: Analyte detected in the associated Method Blank at a concentration > 1/2 the PQL
E: Analyte concentration reported that exceeds the upper calibration standard. Greater uncertainty is associated with this result and data should be consider estimated.
H: Holding time for preparation or analysis has been exceeded.
J: Analyte concentration is reported, and is less than the PQL and greater than or equal to the MDL. The result reported is an estimate.
S: % REC (% recovery) exceeds control limits

CERTIFICATIONS:
Beaver, WV: WVDHHR 00412CM, WVDEP 060, VADCLS 00281, KYDEP 90039, TNDEQ TN02926, NCDWQ 466, PADEP 68-00839, VADCLS (VELAP) 460148
Bioassay (Beaver, WV): WVDEP 060, VADCLS(VELAP) 460149, PADEP 68-00839
Roanoke, VA: VADCLS(VELAP) 460150
Verona, VA: VADCLS(VELAP) 460151
Ashland, KY: KYDEP 00094

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Certificate of Analysis

Final Report

Laboratory Order ID 12020215

Client Name: Western Virginia Water Authority
1502 Brownlee Ave. S.E.
Roanoke, VA 24014

Date Received: February 13, 2012
Date Issued: March 06, 2012

Submitted To: Janis Richardson

Project Number: NA

Client Site I.D.: Western Virginia Water Authority WPCP

Purchase Order: NA

Analytical Results

Sample I.D.: Effluent

Laboratory Sample I.D.: 12020215-002

Date/Time Sampled (Start/Stop): 02/12/12 07:18 to 02/13/12 07:36

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
Mirex	SW8081B	< 0.1 ug/L		0.1	02/17/2012 09:40	02/20/2012 18:12	SKS
4,4-DDD	EPA608	< 0.1 ug/L		0.1	02/17/2012 09:40	02/20/2012 18:12	SKS
4,4-DDE	EPA608	< 0.04 ug/L		0.04	02/17/2012 09:40	02/20/2012 18:12	SKS
4,4-DDT	EPA608	< 0.01 ug/L		0.01	02/17/2012 09:40	02/20/2012 18:12	SKS
Aldrin	EPA608	< 0.005 ug/L		0.005	02/17/2012 09:40	02/20/2012 18:12	SKS
alpha-BHC	EPA608	< 0.01 ug/L		0.01	02/17/2012 09:40	02/20/2012 18:12	SKS
beta-BHC	EPA608	< 0.01 ug/L		0.01	02/17/2012 09:40	02/20/2012 18:12	SKS
Chlordane	EPA608	< 0.2 ug/L		0.2	02/17/2012 09:40	02/20/2012 18:12	SKS
Dieldrin	EPA608	< 0.005 ug/L		0.005	02/17/2012 09:40	02/20/2012 18:12	SKS
Endosulfan I	EPA608	< 0.1 ug/L		0.1	02/17/2012 09:40	02/20/2012 18:12	SKS
Endosulfan II	EPA608	< 0.04 ug/L		0.04	02/17/2012 09:40	02/20/2012 18:12	SKS
Endosulfan sulfate	EPA608	< 0.01 ug/L		0.01	02/17/2012 09:40	02/20/2012 18:12	SKS
Endrin	EPA608	< 0.1 ug/L		0.1	02/17/2012 09:40	02/20/2012 18:12	SKS
Endrin aldehyde	EPA608	< 0.2 ug/L		0.2	02/17/2012 09:40	02/20/2012 18:12	SKS
gamma-BHC (Lindane)	EPA608	< 0.02 ug/L		0.02	02/17/2012 09:40	02/20/2012 18:12	SKS
Heptachlor	EPA608	< 0.05 ug/L		0.05	02/17/2012 09:40	02/20/2012 18:12	SKS
Heptachlor epoxide	EPA608	< 0.2 ug/L		0.2	02/17/2012 09:40	02/20/2012 18:12	SKS
Methoxychlor	EPA608	< 2 ug/L		2	02/17/2012 09:40	02/20/2012 18:12	SKS
Toxaphene	EPA608	< 3 ug/L		3	02/17/2012 09:40	02/20/2012 18:12	SKS

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Certificate of Analysis

Final Report

Laboratory Order ID 12020215

Client Name: Western Virginia Water Authority
1502 Brownlee Ave. S.E.
Roanoke, VA 24014

Date Received: February 13, 2012
Date Issued: March 06, 2012

Submitted To: Janis Richardson

Project Number: NA

Client Site I.D.: Western Virginia Water Authority WPCP

Purchase Order: NA

Analytical Results

Sample I.D.: Effluent

Laboratory Sample I.D.: 12020215-004

Date/Time Sampled (Start/Stop): 02/12/12 07:18 to 02/13/12 07:36

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
Azobenzene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Kepone	SW8270D	< 20 ug/L		20	02/16/2012 09:07	02/20/2012 21:16	JHV
2-Chlorophenol	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
2,4-Dichlorophenol	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
2,4-Dimethylphenol	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
4,6-Dinitro-2-methylphenol	EPA625	< 50 ug/L		50	02/16/2012 09:07	02/20/2012 21:16	JHV
2,4-Dinitrophenol	EPA625	< 50 ug/L		50	02/16/2012 09:07	02/20/2012 21:16	JHV
Pentachlorophenol	EPA625	< 20 ug/L		20	02/16/2012 09:07	02/20/2012 21:16	JHV
Phenol	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
2,4,6-Trichlorophenol	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Acenaphthene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Anthracene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Benzo (a) anthracene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Benzo (b) fluoranthene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Benzo (k) fluoranthene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Benzo (a) pyrene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Butyl benzyl phthalate	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
bis (2-Chloroethyl) ether	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
bis (2-Chloroisopropyl) ether	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Chrysene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Dibenz (a,h) anthracene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Di-n-butyl phthalate	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Diethyl phthalate	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Dimethyl phthalate	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
2,4-Dinitrotoluene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV

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Certificate of Analysis

Final Report

Laboratory Order ID 12020215

Client Name: Western Virginia Water Authority
1502 Brownlee Ave. S.E.
Roanoke, VA 24014

Date Received: February 13, 2012
Date Issued: March 06, 2012

Submitted To: Janis Richardson
Project Number: NA
Client Site I.D.: Western Virginia Water Authority WPCP
Purchase Order: NA

Analytical Results

Sample I.D.: Effluent
Laboratory Sample I.D.: 12020215-004
Date/Time Sampled (Start/Stop): 02/12/12 07:18 to 02/13/12 07:36

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
bis (2-Ethylhexyl) phthalate	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Fluoranthene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Fluorene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Hexachlorobenzene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Hexachlorobutadiene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Hexachlorocyclopentadiene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Hexachloroethane	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Indeno (1,2,3-cd) pyrene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Isophorone	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Nitrobenzene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
N-Nitrosodimethylamine	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
N-Nitrosodiphenylamine	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
N-Nitrosodi-N-propylamine	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Pyrene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
1,2,4-Trichlorobenzene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
Benzidine	EPA625	< 50 ug/L		50	02/16/2012 09:07	02/20/2012 21:16	JHV
3,3-Dichlorobenzidine	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV
2-Chloronaphthalene	EPA625	< 10 ug/L		10	02/16/2012 09:07	02/20/2012 21:16	JHV

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Certificate of Analysis

Final Report

Laboratory Order ID 12020215

Client Name: Western Virginia Water Authority
1502 Brownlee Ave. S.E.
Roanoke, VA 24014

Date Received: February 13, 2012
Date Issued: March 06, 2012

Submitted To: Janis Richardson
Project Number: NA
Client Site I.D.: Western Virginia Water Authority WPCP
Purchase Order: NA

Analytical Results

Sample I.D.: Effluent
Laboratory Sample I.D.: 12020215-005
Date/Time Sampled: 02/13/12 07:35

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
Acrolein	EPA624	< 50 ug/L		50	02/21/2012 20:37	02/21/2012 20:37	MKD
Acrylonitrile	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Vinyl chloride	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Bromomethane	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,1-Dichloroethylene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Methylene chloride	EPA624	< 20 ug/L		20	02/21/2012 20:37	02/21/2012 20:37	MKD
trans-1,2-Dichloroethylene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Chloroform	EPA624	18.7 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Carbon tetrachloride	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Benzene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,2-Dichloroethane	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Trichloroethylene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,2-Dichloropropane	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Bromodichloromethane	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
cis-1,3-Dichloropropene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Toluene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
trans-1,3-Dichloropropene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,3-Dichloropropene, Total	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,1,2-Trichloroethane	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Tetrachloroethylene (PCE)	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Dibromochloromethane	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Chlorobenzene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Ethylbenzene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
Bromoform	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,1,2,2-Tetrachloroethane	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD

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Certificate of Analysis

Final Report

Laboratory Order ID 12020215

Client Name:	Western Virginia Water Authority 1502 Brownlee Ave. S.E. Roanoke, VA 24014	Date Received: Date Issued:	February 13, 2012 March 06, 2012
Submitted To:	Janis Richardson	Project Number:	NA
Client Site I.D.:	Western Virginia Water Authority WPCP	Purchase Order:	NA

Analytical Results

Sample I.D.: Effluent — Laboratory Sample I.D.: 12020215-005

Date/Time Sampled: 02/13/12 07:35

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
1,3-Dichlorobenzene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,4-Dichlorobenzene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD
1,2-Dichlorobenzene	EPA624	< 10 ug/L		10	02/21/2012 20:37	02/21/2012 20:37	MKD

Analytical Results

Sample I.D.: Effluent — Laboratory Sample I.D.: 12020215-006

Date/Time Sampled (Start/Stop): 02/12/12 07:18 to 02/13/12 07:36

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
Cyanide	Kelada-01	< 0.01 mg/L		0.01	02/22/2012 12:56	02/22/2012 12:56	NMK

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Final Report

Laboratory Order ID 12020215

Client Name: Western Virginia Water Authority
1502 Brownlee Ave. S.E.
Roanoke, VA 24014

Date Received: February 13, 2012
Date Issued: March 06, 2012

Submitted To: Janis Richardson
Project Number: NA
Client Site I.D.: Western Virginia Water Authority WPCP
Purchase Order: NA

Analytical Results

Sample I.D.: Effluent
Laboratory Sample I.D.: 12020215-007
Date/Time Sampled (Start/Stop): 02/12/12 07:18 to 02/13/12 07:36

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
Temperature	EPA170.1	17.4 °C		--	02/14/2012 15:41	02/14/2012 15:41	KMK
Hydrogen Sulfide (calc)	SM18/4500-S2 H	< 1 mg/L		1	02/21/2012 11:30	02/21/2012 11:30	KMK
pH	SM18/4500-H B	7.3 SU		--	02/14/2012 15:41	02/14/2012 15:41	KMK
The pH measurement was performed outside of the 15 minute holding time.							
Sulfide	SM18/4500-S2 E	< 1 mg/L		1	02/21/2012 11:30	02/21/2012 11:30	KMK
TDS	SM18/2540C	356 mg/L		10	02/15/2012 14:22	02/15/2012 14:22	NMK

Analytical Results

Sample I.D.: Effluent
Laboratory Sample I.D.: 12020215-008
Date/Time Sampled (Start/Stop): 02/12/12 07:18 to 02/13/12 07:36

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
Tributyltin	85-3295	See Attached		--			

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ANALYTICAL RESULTS

Description: 12020215-003
Matrix: Waste Water
Project: 12020215

Lab Sample ID: A200806-01
Sampled: 02/13/12 07:30
Sampled By:

Received: 02/14/12 11:05
Work Order: A200806

Organophosphorus Compounds by GC

^ - ENCO Orlando certified analyte [VELAP 460186]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Azinphos-methyl [86-50-0] ^	0.15	U	ug/L	1	0.15	0.50	2B13027	EPA 8141B	02/17/12 09:06	RC	
Chlorpyrifos [2921-88-2] ^	0.078	U	ug/L	1	0.078	0.50	2B13027	EPA 8141B	02/17/12 09:06	RC	
Demeton [8065-48-3] ^	0.064	U	ug/L	1	0.064	0.50	2B13027	EPA 8141B	02/17/12 09:06	RC	
Malathion [121-75-5] ^	0.10	U	ug/L	1	0.10	0.50	2B13027	EPA 8141B	02/17/12 09:06	RC	

Surrogates	*Results*	*DF*	*Spike Lvl*	*% Rec*	*% Rec Limits*	*Batch*	*Method*	*Analyzed*	*By*	Notes
Tributyl Phosphate	*0.0*	*1*			*17-139*	*2B13027*	*EPA 8141B*	*02/17/12 09:06*	*RC*	
Triphenyl phosphate	*4.8*	*1*	*10.0*	*48 %*	*22-165*	*2B13027*	*EPA 8141B*	*02/17/12 09:06*	*RC*	

This report relates only to the sample as received by the laboratory, and may only be reproduced in full.

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FLAGS/NOTES AND DEFINITIONS

PQL	PQL: Practical Quantitation Limit.
B	Results are based upon membrane filter colony counts that are outside the method indicated ideal range.
I	The reported value is between the laboratory method detection limit (MDL) and the practical quantitation limit (PQL).
J	Estimated value.
K	Off-scale low; Actual value is known to be less than the value given.
L	Off-scale high; Actual value is known to be greater than value given.
M	Presence of analyte is verified but not quantified; the actual value is less than the MRL but greater than the MDL.
N	Presumptive evidence of presence of material.
O	Sampled, but analysis lost or not performed.
Q	Sample exceeded the accepted holding time.
T	Value reported is less than the laboratory method detection limit. The value is reported for informational purposes only and shall not be used in statistical analysis.
U	Indicates that the compound was analyzed for but not detected.
V	Indicates that the analyte was detected in both the sample and the associated method blank.
Y	The laboratory analysis was from an improperly preserved sample. The data may not be accurate.
Z	Too many colonies were present (TNTC); the numeric value represents the filtration volume.
?	Data are rejected and should not be used. Some or all of the quality control data for the analyte were outside criteria, and the presence or absence of the analyte cannot be determined from the data.
*	Not reported due to interference.
QV-02	The associated continuing calibration verification standard exhibited low bias; the reported result should be considered to be a minimum estimate.

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: 12020215
Pace Project No.: 3063721

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

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without the written consent of Pace Analytical Services, Inc..

ANALYTICAL DATA REPORT

UL ORDER ID 1202248

UL Sample Number 1202248-001

Grab Date/Time: 2/13/2012 07:30:00

Composite Start: N/A

Composite Stop: N/A

Collected By: CLIENT

Sample Site: AWS 12020215-008

Client Sample ID: AWS 12020215-008

Sample Matrix: Wastewater

Parameter	Test Result	Units	RL	Analysis Date/Time	Analyst	Comment
GC/FPD						
TBT Tributyltin	<0.03	ug/L	0.03	2/17/2012 12:25:00	HAM	

Comments for 1202248-001

No comments

ANALYTICAL DATA REPORT

UL ORDER ID 1202248

Analytical Methods Reference VDEH Lab# 00030 (Hampton) VDEH Lab# 00095 (Fredricksburg) NCWW Lab # 643 (Hampton)
NCDW Lab # 51706 (Hampton) VELAP ID 480036 (Hampton)

Description:	Prep Method:	Method	Reference	accredited/none
Wastewater				
TBT Tributyltin	[illegible]	GC/FPD		Accredited

NOTE: Analysis is performed according to Universal Laboratories Standard Operating Procedures which are based on the analytical methods referenced above

GLOSSARY OF TERMS AND ABBREVIATIONS

RL (Reporting Limit). The minimum levels, concentrations, or quantities of target analyte that can be reported with a specified degree of confidence. Generally this number is near or equal to the lowest calibration standard run with the analytical batch.

MDL (Method Detection Limit): The constituent concentration that, when processed through the complete method, produces a signal with a 99% probability that it is different from the blank.

LCS (Laboratory Control Sample): is a sample matrix free from the analytes of interest, spiked with verified amounts of analytes.

MS (Matrix Spike): a sample prepared by adding a known mass of target analyte to a specific amount of sample for which an independent estimate of target analyte concentration is available.

MSD (Matrix Spike Duplicate): is a replicate matrix spike prepared in the laboratory and anlysed to obtain a measure of the precision recovery for each analyte.

Surrogate is a substance with properties that mimic the analyte of interest. It is unlikely to be found in environmental samples and is added to them for quality control purposes.

IS (Internal Standard). Is a known amount of standard added to a test portion of the sample as a reference for evaluation and controlling the precision and bias of the applied analytical method.
RPD (Relative Percent Difference) is the difference between a set of sample duplicates or sample spike duplicates.

ICV (Initial Calibration Verification) CCV (Continuing Calibration Verification) FCV (Final Calibration Verification)

Method Blank is a sample matrix similar to the batch of associated samples that is free from analytes of interest and is processed simultaneously with and under the same conditions as samples.

Trip Blank is a sample of analyte free media collected in the same type of container that is required for the analytical test, taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures.

Holding Time is the maximum times that samples may be held prior to analysis and still be considered valid or not compromised.

ug/L=ppb ug/kg=ppb mg/kg=ppm mg/L=ppm

QC Flag	Description
B	Analyte found in method blank
H	Holding time exceeded
L	LCS outside acceptable limits
V	ICV/CCV/FCV outside acceptable limits
D	RPD outside acceptable limits
MS	Matrix spike recovery outside acceptable limits
J	Result above calibration curve approximate value
QC	Method QC Criteria not met
MI	Matrix interference
S	Surrogate outside acceptable limits
IS	Internal standard outside acceptable limits

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1143652
Project Code: WVWA
Sample Point: FNE
Sample Date: 03/16/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	70.0	5.0	JGETTI	03/22/11	0709
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	KWILLI	03/24/11	1414
Copper Dissolved	EPA200.8	ug/L	3.90	0.50	KWILLI	03/24/11	1414

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 3/30/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

RECEIVED
MAY 10 2011
DEQ - BRRO

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1155095
Project Code: WVWA
Sample Point: FNE
Sample Date: 04/07/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	70	5	JGETTI	04/14/11	0915
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	CBATO	04/19/11	1137
Copper Dissolved	EPA200.8	ug/L	3.27	0.50	CBATO	04/19/11	1330

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: _____
Lab Manager / QA Manager

Date: 4/26/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1163610
Project Code: WVWA
Sample Point: FNE
Sample Date: 05/13/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	76.0	5.0	JGETTI	05/19/11	1022
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	CBATO	05/27/11	0913
Copper Dissolved	EPA200.8	ug/L	4.03	0.50	CBATO	05/27/11	0913

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 6/2/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1180339
Project Code: WVWA
Sample Point: FNE
Sample Date: 06/13/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	93	5	JGETTI	06/23/11	0906
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	CBATO	06/22/11	1251
Copper Dissolved	EPA200.8	ug/L	4.17	0.50	CBATO	06/22/11	1251

Notes

[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 6/28/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1187992
Project Code: WVWA
Sample Point: FNE
Sample Date: 07/13/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	86	5	JGETTI	07/19/11	0736
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	CBATO	07/27/11	1224
Copper Dissolved	EPA200.8	ug/L	3.23	0.50	CBATO	07/27/11	1224

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 7/29/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1189066
Project Code: WVWA
Sample Point: FNE
Sample Date: 08/03/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	90	5	JGETTI	08/09/11	0737
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	KWILLI	08/15/11	1707
Copper Dissolved	EPA200.8	ug/L	2.92	0.50	CBATO	08/15/11	1531

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 8/17/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1197358
Project Code: WVWA
Sample Point: FNE
Sample Date: 09/14/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	96	5	JGETTI	09/19/11	1136
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	KWILLI	09/26/11	1348
Copper Dissolved	EPA200.8	ug/L	3.03	0.50	KWILLI	09/26/11	1348

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 9/27/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1207884
Project Code: WVWA
Sample Point: FNE
Sample Date: 10/07/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	95.0	5.0	JGETTI	10/18/11	1055
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	CBATO	10/19/11	1123
Copper Dissolved	EPA200.8	ug/L	5.10	0.50	CBATO	10/19/11	1123

Notes

[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 10/24/11

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1217410
Project Code: WVWA
Sample Point: FNE
Sample Date: 11/12/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	85	5	JGETTI	11/17/11	0734
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	KWILLI	11/22/11	1425
Copper Dissolved	EPA200.8	ug/L	10.3	0.50	KWILLI	11/22/11	1425

Notes

[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: PRhee
Lab Manager / QA Manager

Date: 112311

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Sample Number: 1226264
Project Code: WVWA
Sample Point: FNE
Sample Date: 12/07/11

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Cl	SM4500CL	mg/l	53	5	JGETTI	12/16/11	
Cadmium Dissolved	EPA200.8	ug/L	< 0.05	0.05	KWILLI	12/13/11	1119
Copper Dissolved	EPA200.8	ug/L	3.91	0.50	KWILLI	12/13/11	1119

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: Robin Parnell
Lab Manager / QA Manager

Date: 12/21/11

AIR WATER & SOIL LABORATORIES, INC.
2109A North Hamilton Street • Richmond, Virginia 23230 • Tel: (804) 358-8295 Fax: (804) 358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 12020215

Client Name: Western Virginia Water Authority
1502 Brownlee Ave. S.E.
Roanoke, VA 24014

Date Received: February 13, 2012
Date Issued: March 06, 2012

Submitted To: Janis Richardson
Project Number: NA
Client Site I.D.: Western Virginia Water Authority WPCP
Purchase Order: NA

Analytical Results

Sample I.D.: Effluent
Laboratory Sample I.D.: 12020215-001
Date/Time Sampled (Start/Stop): 02/12/12 07:16 to 02/13/12 07:36

Parameter	Method	Sample Results	Qual	Rep Limit	Samp Prep Date/Time	Analysis Date/Time	Analyst
Chromium, Dissolved Hexavalent	SM18/3500-Cr D	< 0.005 mg/L		0.005	02/13/2012 16:30	02/13/2012 16:30	KEW
Chromium, Dissolved Trivalent	Calc.	< 0.01 mg/L		0.01	02/13/2012 16:30	02/13/2012 16:30	KEW
Antimony, Dissolved	EPA200.9/R2.2	< 0.005 mg/L		0.005	02/16/2012 15:50	02/17/2012 23:42	DSK
Arsenic, Dissolved	EPA200.9/R2.2	< 0.005 mg/L		0.005	02/16/2012 15:50	02/21/2012 15:06	DSK
Chromium, Dissolved	EPA200.7/R4.4	< 0.01 mg/L		0.01	02/16/2012 15:50	02/27/2012 14:12	CGT
Lead, Dissolved	EPA200.9/R2.2	0.0021 mg/L		0.002	02/16/2012 15:50	02/27/2012 12:48	MWL
Mercury, Dissolved	EPA245.1/R3.0	< 0.0002 mg/L		0.0002	02/16/2012 10:50	02/17/2012 15:17	MWL
Nickel, Dissolved	EPA200.9/R2.2	< 0.003 mg/L		0.003	02/16/2012 15:50	02/23/2012 09:23	DSK
Selenium, Dissolved	EPA200.9/R2.2	< 0.003 mg/L		0.003	02/16/2012 15:50	02/22/2012 11:56	DSK
Silver, Dissolved	EPA200.9/R2.2	< 0.0005 mg/L		0.0005	02/16/2012 15:50	02/23/2012 15:55	DSK
Thallium, Dissolved	EPA200.9/R2.2	< 0.002 mg/L		0.002	02/16/2012 15:50	02/18/2012 00:19	MWL
Zinc, Dissolved	EPA200.7/R4.4	0.0223 mg/L		0.01	02/16/2012 15:50	02/27/2012 14:12	CGT

030620121810

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Commonwealth of Virginia
Accreditation # 460021

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Project Code: WVWA
Sample Point: FNE
Sample Date: 04/04/13

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Antimony Total	EPA 200.8	ug/L	<1.0	1.0	KWILLI	04/11/13	11:39
Arsenic Total	EPA 200.8	ug/L	<1.0	1.0	KWILLI	04/11/13	11:39
Beryllium Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	04/11/13	11:39
Cadmium Total	EPA 200.8	ug/L	<0.05	0.05	KWILLI	04/11/13	11:39
Chromium Total	EPA 200.8	ug/L	<1.00	1.00	KWILLI	04/11/13	11:39
Copper Total	EPA 200.8	ug/L	5.25	0.50	KWILLI	04/11/13	11:39
Lead Total	EPA 200.8	ug/L	0.34	0.10	KWILLI	04/11/13	11:39
Mercury Total	EPA 245.1	ug/L	<0.10	0.10	SWILLI	04/12/13	12:36
Nickel Total	EPA 200.8	ug/L	1.66	0.50	KWILLI	04/11/13	11:39
Selenium Total	EPA 200.8	ug/L	<0.50	0.50	KWILLI	04/11/13	11:39
Silver Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	04/11/13	11:39
Thallium Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	04/11/13	11:39
Zinc Total	EPA 200.8	ug/L	21.6	1.0	KWILLI	04/11/13	11:39

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: _____
Lab Manager / QA Manager

Date: 4/19/13

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Project Code: WVWA
Sample Point: FNE
Sample Date: 05/29/13

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Antimony Total	EPA 200.8	ug/L	<1.0	1.0	KWILLI	06/04/13	11:29
Arsenic Total	EPA 200.8	ug/L	<1.0	1.0	KWILLI	06/04/13	11:29
Beryllium Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	06/04/13	11:29
Cadmium Total	EPA 200.8	ug/L	<0.05	0.05	KWILLI	06/04/13	11:29
Chromium Total	EPA 200.8	ug/L	<1.00	1.00	KWILLI	06/04/13	11:29
Copper Total	EPA 200.8	ug/L	5.75	0.50	KWILLI	06/04/13	11:29
Lead Total	EPA 200.8	ug/L	0.14	0.10	KWILLI	06/04/13	11:29
Mercury Total	EPA 245.1	ug/L	<0.10	0.10	SWILLI	06/06/13	10:44
Nickel Total	EPA 200.8	ug/L	2.17	0.50	KWILLI	06/04/13	11:29
Selenium Total	EPA 200.8	ug/L	<0.50	0.50	KWILLI	06/04/13	11:29
Silver Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	06/04/13	11:29
Thallium Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	06/04/13	11:29
Zinc Total	EPA 200.8	ug/L	14.5	1.0	KWILLI	06/04/13	11:29

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization:
Lab Manager/QA Manager

Date: 06-07-13

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CENTRAL ENVIRONMENTAL LABORATORY
ANALYTICAL REPORT

Project: Western Virginia Water Authority
Customer Sample ID: Final Effluent
Project Code: WVWA
Sample Point: FNE
Sample Date: 06/27/13

Analyte	Method	Unit	Result	Report Limit[1]	Analyst	Analysis Date	Analysis Time
Antimony Total	EPA 200.8	ug/L	<1.0	1.0	KWILLI	07/08/13	14:30
Arsenic Total	EPA 200.8	ug/L	<1.0	1.0	KWILLI	07/08/13	14:30
Beryllium Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	07/08/13	14:30
Cadmium Total	EPA 200.8	ug/L	<0.05	0.05	KWILLI	07/08/13	14:30
Chromium Total	EPA 200.8	ug/L	<1.00	1.00	KWILLI	07/08/13	14:30
Copper Total	EPA 200.8	ug/L	5.53	0.50	KWILLI	07/08/13	14:30
Lead Total	EPA 200.8	ug/L	0.18	0.10	KWILLI	07/08/13	14:30
Mercury Total	EPA 245.1	ug/L	<0.10	0.10	SWILLI	07/03/13	10:11
Nickel Total	EPA 200.8	ug/L	3.46	0.50	KWILLI	07/08/13	14:30
Selenium Total	EPA 200.8	ug/L	<0.50	0.50	KWILLI	07/08/13	14:30
Silver Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	07/08/13	14:30
Thallium Total	EPA 200.8	ug/L	<0.10	0.10	KWILLI	07/09/13	13:25
Zinc Total	EPA 200.8	ug/L	15.5	1.0	KWILLI	07/08/13	14:30

Notes
[1] *Report Limit is lowest concentration at which quantitation is demonstrated.*

Authorization: _____
Lab Manager / QA Manager

Date: 7/16/13

REI Consultants, Inc. - Analytical Report

WO#: 1305V06

Date Reported: 6/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	5/29/2013 10:05:00 AM
Project:	MAY SAMPLING	**Date Received:**	5/29/2013
Lab ID:	1305V06-04A	**Matrix:**	Waste Water
Client Sample ID:	001 - GRAB 4	**Site ID:**	001

Analysis	Result	PQL	MCL	Qual	Units	PrepDate	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	CY		NA				
pH, SM4500H+ B	7.10		NA		S.U.		
ACROLEIN BY E624		**Method: E624**					**Analyst: RB**
Acrolein	ND	10	NA		µg/L		5/31/2013 12:59 AM
VOLATILE ORGANIC COMPOUNDS		**Method: E624**					**Analyst: RB**
Benzene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Bromodichloromethane	14.3	1.0	NA		µg/L		5/31/2013 12:59 AM
Bromoform	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Bromomethane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Carbon tetrachloride	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Chlorobenzene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Chloroethane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Chloroform	17.0	10	NA		µg/L		6/3/2013 9:56 PM
Chloromethane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Dibromochloromethane	2.7	1.0	NA		µg/L		5/31/2013 12:59 AM
1,1-Dichloroethene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
trans-1,2-Dichloroethene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
1,2-Dichloropropane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
cis-1,3-Dichloropropene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
trans-1,3-Dichloropropene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Ethylbenzene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Methylene chloride	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
1,1,2,2-Tetrachloroethane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Tetrachloroethene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Toluene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
1,1,1-Trichloroethane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
1,1,2-Trichloroethane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Trichloroethene	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Trichlorofluoromethane	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Vinyl chloride	ND	1.0	NA		µg/L		5/31/2013 12:59 AM
Surr: 1,2-Dichloroethane-d4	124	73.2-133	NA		%REC		5/31/2013 12:59 AM
Surr: Toluene-d8	81.1	71-132	NA		%REC		5/31/2013 12:59 AM
Surr: 4-Bromofluorobenzene	99.4	74.2-129	NA		%REC		5/31/2013 12:59 AM
VOLATILE ORGANIC COMPOUNDS-624		**Method: E624**					**Analyst: RB**
2-Chloroethyl vinyl ether	ND	5.0	NA		µg/L		5/31/2013 12:59 AM
Acrylonitrile	ND	10	NA		µg/L		5/31/2013 12:59 AM
Surr: 1,2-Dichloroethane-d4	124	73.2-133	NA		%REC		5/31/2013 12:59 AM

REI Consultants, Inc. - Analytical Report

WO#: 1305V06

Date Reported: 6/11/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	5/29/2013 10:05:00 AM
Project:	MAY SAMPLING	**Date Received:**	5/29/2013
Lab ID:	1305V06-04A	**Matrix:**	Waste Water
Client Sample ID:	001 - GRAB 4	**Site ID:**	001

Analysis	Result	PQL	MCL	Qual	Units	PrepDate	Date Analyzed
Surr: Toluene-d8	81.1	71-132	NA		%REC		5/31/2013 12:59 AM
Surr: 4-Bromofluorobenzene	99.4	74.2-129	NA		%REC		5/31/2013 12:59 AM
OIL and GREASE		**Method: EPA1664A**					**Analyst: MC**
Oil & Grease	ND	5.0	NA		mg/L		6/7/2013 10:00 AM
PHENOLICS		**Method: E420.1**					**Analyst: BA**
Phenolics	ND	0.010	NA		mg/L		5/31/2013 1:00 PM
Cyanide		**Method: E335.4**					**Analyst: AL**
Cyanide, Total	ND	0.020	NA		mg/L	5/31/2013 8:35 AM	5/31/2013 11:25 AM

Attachment M

Summary Effluent Data Tables

- DO, *E. coli*
- Hardness
- Metals (Dissolved, Total Recoverable, Clean Metals Sampling)
- PCBs
- pH
- Phosphorus, BOD_5, Flow
- Temperature
- TKN
- TSS, TRC
- Quantifiable Nonmetals from Application

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	DO Minimum (mg/L)	*E. coli* N/100 mL
55 MGD Limits	**6.0**	**126**
10-Apr-09	8.1	1
10-May-09	7.8	1
10-Jun-09	7	1
10-Jul-09	6.7	1
10-Aug-09	7	1
10-Sep-09	6.9	1
10-Oct-09	7.2	1
10-Nov-09	7.5	1
10-Dec-09	7.9	1
10-Jan-10	8	4
10-Feb-10	8.8	2
10-Mar-10	8.8	1
10-Apr-10	6.6	2
10-May-10	8.2	1
10-Jun-10	7.7	1
10-Jul-10	7.1	1
10-Aug-10	6.9	1
10-Sep-10	6.8	1
10-Oct-10	6.9	1
10-Nov-10	7.4	1
10-Dec-10	7.9	1
10-Jan-11	7.6	1
10-Feb-11	7.8	1
10-Mar-11	7.4	1
10-Apr-11	6.6	1
10-May-11	6.9	1
10-Jun-11	6.7	1
10-Jul-11	6.3	1
10-Aug-11	6	1
10-Sep-11	6	1
10-Oct-11	6.6	2
10-Nov-11	6.6	1
10-Dec-11	6.5	3
10-Jan-12	6.8	1
10-Feb-12	7.8	1
10-Mar-12	7.9	1
10-Apr-12	6.5	1
10-May-12	6.4	1
10-Jun-12	6.9	1
10-Jul-12	7.1	1
10-Aug-12	6.6	1
10-Sep-12	6.8	1
10-Oct-12	6.8	1
10-Nov-12	7.4	1
10-Dec-12	6.2	1
10-Jan-13	6	1
10-Feb-13	6.8	1
10-Mar-13	6.8	1
10-Apr-13	6.6	3
10-May-13	6.5	1
10-Jun-13	6.9	1
10-Jul-13	6.4	1
10-Aug-13	6.5	1
10-Sep-13	6.1	1
10-Oct-13	6.4	1
10-Nov-13	6.6	1

Western Virginia Water Authority WPCP
VA0025020

Effluent Hardness Composite

Date	mg/l as $CaCO_3$	
02/15/10	200	
02/16/10	200	
02/17/10	230	
02/18/10	220	
02/19/19	200	
03/08/10	210	
03/09/10	204	
03/10/10	202	
03/11/10	218	
03/12/10	210	
05/17/10	186	
05/18/10	176	
05/19/10	178	
05/20/10	194	
05/21/10	198	
06/20/11	192	
06/21/11	198	
06/22/11	190	
06/23/11	192	
06/24/11	194	
5/21/12	168	
05/22/12	176	
05/23/12	166	
05/24/12	170	
05/25/12	174	
04/04/13	192	
04/29/13	180	
04/30/13	180	
05/01/13	182	
05/02/13	180	
05/03/13	182	
05/28/13	190	
05/29/13	186	*
05/29/13	188	*
05/30/13	202	
05/31/13	198	
06/24/13	196	
06/25/13	204	
06/26/13	196	
06/27/13	188	
06/28/13	182	
07/29/13	198	
07/30/13	200	
07/31/13	194	
08/01/13	198	
08/03/13	198	
08/19/13	176	
08/20/13	178	
08/21/13	190	
08/22/13	184	
08/24/13	184	
09/09/13	200	
09/10/13	194	
09/11/13	192	
09/12/13	192	
Mean	**193**	

*Note: 2 samples taken on 5/29/13 for toxicity testing and application

WVWA WPCP
VA0025020
Outfall 001

Summary of Effluent Application Data Above Quantification

Date	Cu, TR (ug/L) G	Pb, Total (ug/L) G	Pb, Dis (ug/L) C	Ni, Total (ugL) G	Zn, Dis (ug/L) C	Zn, Total (ug/L) G
2/13/2012			2.1		22.3	
4/4/2013	5.25	0.34		1.66		21.6
5/29/2013	5.75	0.14		2.17		14.5
6/27/2013	5.53	0.18		3.46		15.5

* Dissolved copper and dissolved zinc collected earlier using clean sampling techniques.
G= grab
C= composite
Dis = dissolved

Western Virginia Water Authority WPCP
VA0025020

Effluent Dissolved Metals Data (µg/L)

	3/16/11	4/7/11	5/13/11	6/13/11	7/13/11	8/3/11	9/14/11	10/7/11	11/12/11	12/7/11
Chloride	70,000	70,000	76,000	93,000	86,000	90,000	96,000	95,000	85,000	53,000
Cadmium, Dissolved*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Copper, Dissolved*	3.90	3.27	4.03	4.17	3.23	2.92	3.03	5.1	**10.3**	3.91

* Clean metals

WVWA WPCP
VA0025020
Outfall 001

Composite Clean Metals Sampling

Date	Copper, Dissolved (µg/L)	Zinc, Dissolved (µg/L)
10/29/2008	4.7	15.8
10/30/2008	4.9	16.3
10/31/2008	5.5	19.5
11/1/2008	5.3	23.6
11/2/2008	5.7	20.7
11/3/2008	5.8	17.7
11/4/2008	6.1	18.4
11/5/2008	6.4	23.3
11/6/2008	6.3	22.4
11/7/2008	6.6	20.6

WVWA WPCP
VA0025020
Outfall 001

Total PCBs

Identifier	pg/L
#1 DW	538.0
#2 DW	781.8
#3 DW	596.0
#4 DW	1460.1
#1 WW	494.4
#2 WW	664.8

Mean unadjusted 755.9

Data have not been blank corrected
DW dry weather sample
WW wet weather sample

WVWA WPCP
VPDES Permit No. VA0025020

Effluent pH Data for 90th Percentile Calculations

Days	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13
1	7.0	7.2	7.1	6.9	6.9	7.0	7.0	7.0	7.0	7.1	7.0	7.0
2	7.0	7.1	7.0	7.0	6.9	6.9	7.2	7.0	6.9	7.2	7.0	7.0
3	7.1	7.1	7.0	7.1	6.8	6.9	7.2	7.0	7.0	7.2	7.0	7.1
4	7.0	7.0	7.0	7.1	6.8	7.1	7.1	7.2	6.9	7.2	7.0	7.8
5	7.0	7.0	7.1	6.9	6.8	7.1	7.0	6.9	6.9	7.1	6.9	7.3
6	7.0	7.0	7.1	6.9	6.8	7.0	7.0	6.9	7.0	7.1	6.9	7.2
7	7.0	7.2	7.1	6.8	7.0	7.1	7.0	6.9	7.0	7.0	7.1	7.3
8	6.9	7.1	7.1	6.8	7.1	7.0	7.0	7.1	7.1	6.9	7.1	7.2
9	7.0	7.1	7.0	7.0	7.0	6.9	7.0	7.1	6.8	6.8	6.9	7.0
10	7.1	7.2	6.9	7.0	7.0	6.9	7.0	7.2	6.9	7.0	7.0	7.0
11	7.1	7.0	6.9	6.9	6.9	7.2	7.0	7.1	6.9	6.9	7.0	7.0
12	7.1	7.0	7.0	6.9	6.9	7.1	7.0	6.9	7.0	7.1	7.0	7.1
13	7.0	7.1	6.9	6.8	6.9	7.1	7.0	6.9	7.0	7.0	7.0	7.1
14	6.9	7.2	7.0	6.9	7.0	6.9	7.0	7.0	7.1	6.8	7.1	6.9
15	6.9	7.1	7.0	6.8	7.1	7.1	7.1	6.9	7.0	6.8	7.2	7.0
16	6.9	7.2	6.9	7.0	7.0	6.8	7.1	7.2	6.9	6.9	7.2	7.0
17	7.0	7.1	6.9	7.1	7.0	6.8	7.0	7.1	6.9	7.1	7.1	7.1
18	7.0	7.1	6.9	7.0	7.0	7.2	7.1	7.2	6.8	7.1	7.0	7.0
19	7.0	7.1	6.9	6.8	6.9	6.9	7.0	7.0	6.9	7.1	7.0	7.1
20	7.0	7.0	7.1	6.9	6.9	6.8	6.9	7.0	7.0	7.0	7.0	7.1
21	7.0	7.2	7.1	6.9	7.0	7.1	7.1	7.0	7.2	6.8	7.1	7.1
22	7.0	7.2	7.0	6.9	7.1	6.9	7.0	7.1	7.0	7.0	7.2	7.2
23	6.9	7.3	6.9	6.9	7.1	7.0	7.0	7.2	7.0	7.0	7.1	7.1
24	7.1	7.1	7.0	6.9	7.0	7.0	7.1	7.3	7.0	7.1	7.0	7.1
25	7.0	7.0	7.0	6.9	6.9	7.2	7.0	7.2	7.0	7.2	7.0	7.1
26	7.0	7.1	7.0	6.9	6.9	7.1	6.9	6.9	7.0	7.2	6.9	7.1
27	7.0	7.1	7.1	6.8	6.8	7.1	6.8	6.9	7.1	7.2	7.1	7.2
28	6.9	7.2	7.0	6.9	6.9	7.2	6.9	7.0	7.1	7.2	7.1	7.1
29	6.9	7.2	7.0	6.8	7.1	6.9		7.2	7.0	7.1	7.0	7.1
30	6.9	7.1	6.9	6.9	7.0	6.9		7.2	7.1	7.2	7.1	7.0
31	7.2		6.9		7.0	6.9		7.2		7.2		7.1

90th Percentile	7.2 S.U.
10th Percentile	6.9 S.U.

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	pH (S.U.)	
	Minimum	Maximum
55 MGD Limits	6.0	9
10-Apr-09	6.8	7.2
10-May-09	6.8	7.3
10-Jun-09	7	7.4
10-Jul-09	6.9	7.3
10-Aug-09	7	7.6
10-Sep-09	7	7.4
10-Oct-09	6.9	7.5
10-Nov-09	6.9	7.6
10-Dec-09	6.8	7.3
10-Jan-10	6.8	7.3
10-Feb-10	6.8	7.4
10-Mar-10	7	7.4
10-Apr-10	6.8	7.4
10-May-10	6.8	7.6
10-Jun-10	7	7.4
10-Jul-10	6.8	7.3
10-Aug-10	6.9	7.3
10-Sep-10	7	7.3
10-Oct-10	7.1	7.6
10-Nov-10	7.1	7.7
10-Dec-10	7.1	7.6
10-Jan-11	6.8	7.6
10-Feb-11	7	7.6
10-Mar-11	7	7.8
10-Apr-11	6.8	7.9
10-May-11	7	7.6
10-Jun-11	7	7.4
10-Jul-11	6.9	7.3
10-Aug-11	6.9	7.4
10-Sep-11	6.8	7.2
10-Oct-11	6.9	7.4
10-Nov-11	7	7.3
10-Dec-11	7	7.5
10-Jan-12	7	7.4
10-Feb-12	7	7.3
10-Mar-12	6.9	7.2
10-Apr-12	6.9	7.2
10-May-12	7	7.3
10-Jun-12	6.9	7.2
10-Jul-12	7	7.2
10-Aug-12	6.9	7.3
10-Sep-12	6.9	7.2
10-Oct-12	7	7.3
10-Nov-12	6.9	7.1
10-Dec-12	6.8	7.1
10-Jan-13	6.8	7.1
10-Feb-13	6.8	7.2
10-Mar-13	6.8	7.2
10-Apr-13	6.9	7.3
10-May-13	6.8	7.2
10-Jun-13	6.8	7.2
10-Jul-13	6.9	7.2

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	pH (S.U.)	
	Minimum	Maximum
55 MGD Limits	**6.0**	**9**
10-Aug-13	6.9	7.8
10-Sep-13	6.9	7.2
10-Oct-13	6.9	7.2
10-Nov-13	6.8	7.1

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	Phosphorus				BOD_5				Flow	
	Quantity Average (kg/d)	Quantity Max (kg/d)	Conc Average (mg/L)	Conc Max (mg/L)	Quantity Average (kg/d)	Quantity Max (kg/d)	Conc Average (mg/L)	Conc Max (mg/L)	Quantity Average (MGD)	Quantity Max (MGD)
55 MGD Limits	**32**	**48**	**0.20**	**0.30**	**795**	**1192**	**5.0**	**7.5**	**55**	**--**
10-Apr-09	10	14	0.05	0.06	<QL	<QL	<QL	<QL	43.03	77.57
10-May-09	4	2	0.02	0.01	<QL	<QL	<QL	<QL	42.72	90.55
10-Jun-09	8	15	0.04	0.07	<QL	<QL	<QL	<QL	45.72	72.96
10-Jul-09	8	9	0.03	0.03	<QL	<QL	<QL	<QL	48.96	103.4
10-Aug-09	10	14	0.07	0.11	<QL	<QL	<QL	<QL	35.29	69.13
10-Sep-09	11	21	0.08	0.12	<QL	<QL	<QL	<QL	34.52	63.99
10-Oct-09	6	8	0.05	0.07	<QL	<QL	<QL	<QL	32.27	66.34
10-Nov-09	9	13	0.08	0.11	<QL	<QL	<QL	<QL	30.96	46.03
10-Dec-09	10	26	0.04	0.07	<QL	<QL	<QL	<QL	54.17	137.39
10-Jan-10	21	27	0.07	0.1	<QL	<QL	<QL	<QL	**74.72**	120.98
10-Feb-10	16	30	0.06	0.08	<QL	<QL	<QL	<QL	**62.37**	114.62
10-Mar-10	15	21	0.07	0.11	<QL	<QL	<QL	<QL	**57.15**	71.8
10-Apr-10	20	29	0.08	0.13	<QL	<QL	<QL	<QL	**59.02**	97.4
10-May-10	6	12	0.04	0.07	<QL	<QL	<QL	<QL	43.35	59.82
10-Jun-10	10	14	0.07	0.09	25	112	0.2	0.9	36.9	56.68
10-Jul-10	13	23	0.1	0.18	<QL	<QL	<QL	<QL	33.38	38.98
10-Aug-10	3	3	0.03	0.02	<QL	<QL	<QL	<QL	31.46	43.4
10-Sep-10	6	15	0.04	0.09	<QL	<QL	<QL	<QL	35.14	47.04
10-Oct-10	6	6	0.03	0.06	<QL	<QL	<QL	<QL	33.41	101.79
10-Nov-10	6	11	0.05	0.09	<QL	<QL	<QL	<QL	34.91	66.06
10-Dec-10	8	10	0.06	0.08	<QL	<QL	<QL	<QL	33.58	64.34
10-Jan-11	4	7	0.02	0.06	<QL	<QL	<QL	<QL	38.03	114
10-Feb-11	10	14	0.09	0.12	<QL	<QL	<QL	<QL	30.53	39.02
10-Mar-11	8	12	0.06	0.09	<QL	<QL	<QL	<QL	31.57	53.42
10-Apr-11	17	44	0.07	0.13	63	278	0.2	0.8	51.89	123.44
10-May-11	13	28	0.06	0.1	90	387	0.2	0.8	50.57	119.16
10-Jun-11	13	17	0.08	0.09	<QL	<QL	<QL	<QL	41.29	57.25
10-Jul-11	8	10	0.07	0.08	32	138	0.2	1	32.58	43.47
10-Aug-11	7	9	0.06	0.08	25	109	0.2	0.8	31.28	43.23
10-Sep-11	11	11	0.11	0.11	62	71	0.6	0.7	26.81	33.34
10-Oct-11	15	33	0.09	0.13	98	292	0.6	1.3	38.17	127.27
10-Nov-11	9	11	0.07	0.08	<QL	<QL	<QL	<QL	33.59	64.89
10-Dec-11	14	13	0.09	0.11	<QL	<QL	<QL	<QL	38.42	114.65
10-Jan-12	12	19	0.06	0.08	<QL	<QL	<QL	<QL	52.31	124.65
10-Feb-12	13	18	0.09	0.12	<QL	<QL	<QL	<QL	36.9	45.95
10-Mar-12	10	13	0.07	0.08	<QL	<QL	<QL	<QL	37.05	54.79
10-Apr-12	15	21	0.09	0.14	<QL	<QL	<QL	<QL	44.45	82.78
10-May-12	11	14	0.08	0.08	<QL	<QL	<QL	<QL	36.04	52.27
10-Jun-12	15	19	0.11	0.12	<QL	<QL	<QL	<QL	35.48	62.04
10-Jul-12	10	14	0.09	0.12	<QL	<QL	<QL	<QL	30.84	42.73
10-Aug-12	10	12	0.09	0.11	<QL	<QL	<QL	<QL	27.63	30.81
10-Sep-12	8	11	0.07	0.1	<QL	<QL	<QL	<QL	28.71	40.98
10-Oct-12	11	13	0.1	0.12	<QL	<QL	<QL	<QL	28.19	56.63
10-Nov-12	9	9	0.09	0.1	27	120	0.3	1.3	26.1	33.12
10-Dec-12	8	9	0.09	0.09	<QL	<QL	<QL	<QL	25.55	27.64
10-Jan-13	7	11	0.07	0.08	20	89	0.2	0.8	27.23	52.41
10-Feb-13	17	**51**	0.07	0.16	185	565	0.9	2.6	44.02	107.94
10-Mar-13	9	12	0.06	0.1	<QL	<QL	<QL	<QL	41.05	77.05
10-Apr-13	9	20	0.05	0.12	<QL	<QL	<QL	<QL	42.29	56.39
10-May-13	12	15	0.07	0.06	<QL	<QL	<QL	<QL	42.83	89.47
10-Jun-13	16	45	0.07	0.14	<QL	<QL	<QL	<QL	47.74	109.27
10-Jul-13	13	**60**	0.07	0.13	<QL	<QL	<QL	<QL	43.96	94.85

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	Phosphorus				BOD_5				Flow	
	Quantity Average (kg/d)	Quantity Max (kg/d)	Conc Average (mg/L)	Conc Max (mg/L)	Quantity Average (kg/d)	Quantity Max (kg/d)	Conc Average (mg/L)	Conc Max (mg/L)	Quantity Average (MGD)	Quantity Max (MGD)
55 MGD Limits	**32**	**48**	**0.20**	**0.30**	**795**	**1192**	**5.0**	**7.5**	**55**	**--**
10-Aug-13	20	31	0.07	0.08	<QL	<QL	<QL	<QL	**64.04**	125.99
10-Sep-13	8	11	0.06	0.08	<QL	<QL	<QL	<QL	34.54	49.36
10-Oct-13	7	9	0.06	0.08	<QL	<QL	<QL	<QL	29.13	35.02
10-Nov-13	8	10	0.06	0.09	<QL	<QL	<QL	<QL	30.21	79.29

WVWA WPCP
VPDES Permit No. VA0025020

Effluent Temperature Data for 90th Percentile Calculations

Days	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13
1	23.6	22.9	21.6	17.7	15.6	13.9	11.5	12.3	13.8	16.9	19.4	20.8
2	23.2	23.0	21.5	17.6	15.9	14.8	11.6	12.1	13.6	17.4	19.7	21.3
3	22.8	22.8	21.7	17.8	16.5	14.3	12.2	11.8	14.1	16.9	19.2	20.8
4	23.2	23.6	21.9	17.7	17.3	13.8	11.4	11.6	13.9	16.6	19.7	19.7
5	23.2	23.4	21.6	17.6	17.3	13.3	11.8	12.6	13.0	16.5	20.3	19.9
6	23.2	23.2	21.5	17.6	16.5	13.7	12.9	12.3	13.2	16.7	19.4	20.1
7	23.7	22.7	20.9	17.6	16.2	14.1	13.3	12.9	13.3	15.7	18.8	20.0
8	24.3	22.4	20.2	17.4	16.5	14.0	12.6	12.2	13.9	15.6	18.6	20.0
9	23.6	21.3	20.2	16.9	16.3	14.4	12.2	12.6	15.0	15.8	19.4	20.6
10	22.8	21.0	20.5	17.2	16.9	14.9	12.4	12.8	15.3	16.2	19.2	21.1
11	22.9	22.5	20.1	17.2	16.8	14.5	13.0	13.2	15.8	16.5	19.7	21.1
12	21.8	22.0	19.8	17.9	16.3	14.5	13.4	13.6	15.8	16.4	19.5	20.4
13	22.0	22.7	19.7	17.5	16.2	15.5	13.4	13.5	14.5	16.0	19.8	20.5
14	23.6	20.8	19.8	16.8	15.3	15.7	13.7	12.4	14.9	16.2	19.2	20.8
15	23.3	21.6	20.4	17.5	15.3	15.1	13.0	12.4	15.1	16.8	19.1	20.6
16	23.3	21.8	20.2	16.7	15.8	13.1	13.0	13.2	17.4	17.9	19.5	21.6
17	22.5	21.6	20.0	16.7	15.8	13.1	12.0	13.7	16.2	19.0	19.7	20.9
18	22.4	22.1	20.2	16.9	16.2	12.3	11.4	13.2	16.8	18.0	20.0	21.2
19	21.8	22.1	20.1	17.3	16.1	12.3	13.3	13.1	16.5	17.7	20.0	21.2
20	22.3	22.0	19.9	17.1	15.9	12.9	12.9	13.4	15.6	17.6	20.2	21.6
21	22.9	21.9	19.6	16.7	15.2	13.2	12.7	13.2	15.3	18.5	19.6	21.4
22	22.5	22.0	19.4	16.4	14.0	13.4	12.7	12.4	15.0	18.3	19.9	21.4
23	23.0	21.6	19.8	16.2	13.6	12.6	13.2	13.0	16.1	18.2	20.4	21.5
24	22.4	21.1	20.2	15.6	14.7	13.2	13.4	13.1	16.8	17.7	20.6	21.5
25	22.3	21.4	20.4	15.4	15.4	12.4	13.0	12.6	16.2	17.0	20.6	21.5
26	22.0	22.2	20.4	15.7	14.8	12.3	13.4	12.7	15.9	17.1	20.8	21.3
27	21.9	22.0	20.5	16.6	13.3	12.3	12.3	12.7	16.7	17.4	20.7	21.3
28	23.2	22.1	20.1	16.0	13.3	12.7	12.3	12.6	16.4	17.8	20.8	21.2
29	23.3	22.1	19.2	16.7	13.6	13.8		12.9	16.3	18.4	21.1	21.2
30	23.8	21.5	17.9	15.7	13.1	15.0		13.3	16.6	18.8	21.0	21.2
31	22.8		17.7		13.1	13.1		13.8		19.1		21.6

90th Percentile	22.2	°C	
90th Percentile	17.4	°C	(Jan. - May)

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Month	TKN			
	Quantity Monthly Average (kg/d)	Quantity Weekly Average (kg/d)	Conc Monthly Average (mg/L)	Conc Weekly Average (mg/L)
55 MGD Limits (Jan. - Mar.)	**318**	**477**	**2.0**	**3.0**
10-Feb-10	<QL	<QL	<QL	<QL
10-Mar-10	<QL	<QL	<QL	<QL
10-Apr-10	9	39	0.05	0.2
10-Feb-11	4	20		0.2
10-Mar-11	39	28	0.3	0.2
10-Apr-11	94	248	0.4	0.7
10-Feb-12	<QL	<QL	<QL	<QL
10-Mar-12	<QL	<QL	<QL	<QL
10-Apr-12	<QL	<QL	<QL	<QL
10-Feb-13	38	151	0.2	0.6
10-Mar-13	10	<QL	0.04	<QL
10-Apr-13	18	53	0.1	0.2

Month	TKN			
	Quantity Monthly Average (kg/d)	Quantity Weekly Average (kg/d)	Conc Monthly Average (mg/L)	Conc Weekly Average (mg/L)
55 MGD Limits (Apr. - Sep.)	**318**	**477**	**2.0**	**3.0**
10-May-09	<QL	<QL	<QL	<QL
10-Jun-09	7	33	0.03	0.1
10-Jul-09	9	37	0.03	0.1
10-Aug-09	12	36	0.1	0.2
10-Sep-09	<QL	<QL	<QL	<QL
10-Oct-09	<QL	<QL	<QL	<QL
10-May-10	<QL	<QL	<QL	<QL
10-Jun-10	11	26	0.1	0.2
10-Jul-10	<QL	<QL	<QL	<QL
10-Aug-10	<QL	<QL	<QL	<QL
10-Sep-10	<QL	<QL	<QL	<QL
10-Oct-10	<QL	<QL	<QL	<QL
10-May-11	<QL	<QL	<QL	<QL
10-Jun-11	<QL	<QL	<QL	<QL
10-Jul-11	47	73	0.3	0.6
10-Aug-11	12	34	0.1	0.3
10-Sep-11	119	170	1.2	1.7
10-Oct-11	112	378	0.6	1.7
10-May-12	<QL	<QL	<QL	<QL
10-Jun-12	<QL	<QL	<QL	<QL
10-Jul-12	5	21	0.04	0.2
10-Aug-12	<QL	<QL	<QL	<QL
10-Sep-12	<QL	<QL	<QL	<QL
10-Oct-12	<QL	<QL	<QL	<QL
10-May-13	25	109	0.08	0.3
10-Jun-13	54	138	0.2	0.5
10-Jul-13	<QL	<QL	<QL	<QL
10-Aug-13	46	132	0.1	0.3
10-Sep-13	<QL	<QL	<QL	<QL
10-Oct-13	<QL	<QL	<QL	<QL

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	TKN			
	Quantity Monthly Average (kg/d)	Quantity Weekly Average (kg/d)	Conc Monthly Average (mg/L)	Conc Weekly Average (mg/L)
55 MGD Limits (Oct. - Dec.)	**636**	**795**	**2.0**	**3.0**
10-Nov-09	<QL	<QL	<QL	<QL
10-Dec-09	<QL	<QL	<QL	<QL
10-Jan-10	31	88	0.1	0.4
10-Nov-10	<QL	<QL	<QL	<QL
10-Dec-10	9	<QL	0.04	<QL
10-Jan-11	<QL	<QL	<QL	<QL
10-Nov-11	6	27	0.04	0.2
10-Dec-11	12	30	0.07	0.2
10-Jan-12	<QL	<QL	<QL	<QL
10-Nov-12	<QL	<QL	<QL	<QL
10-Dec-12	<QL	<QL	<QL	<QL
10-Jan-13	3	14	0.03	0.1
10-Nov-13	<QL	<QL	<QL	<QL

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	TSS				TRC		TRC Contact
	Quantity Average (kg/d)	Quantity Max (kg/d)	Conc Average (mg/L)	Conc Max (mg/L)	Conc Average (mg/L)	Conc Max (mg/L)	Min (mg/L)
55 MGD Limits	**1040**	**1561**	**5.0**	**1.0**	**0.0028**	**0.0034**	**0.50**
10-Apr-09	224	464	1.2	2	<QL	<QL	0.7
10-May-09	154	129	0.7	0.8	<QL	<QL	0.6
10-Jun-09	249	341	1.3	1.7	<QL	<QL	0.7
10-Jul-09	241	201	0.9	0.7	<QL	<QL	0.6
10-Aug-09	62	131	0.4	0.7	<QL	<QL	0.5
10-Sep-09	109	144	0.8	1	<QL	<QL	**0.3**
10-Oct-09	87	144	0.6	0.7	<QL	<QL	0.7
10-Nov-09	43	126	0.3	0.9	<QL	<QL	0.6
10-Dec-09	223	509	0.8	1	<QL	<QL	0.7
10-Jan-10	733	1035	2.4	3	<QL	<QL	0.7
10-Feb-10	365	970	1.2	2.8	<QL	<QL	0.7
10-Mar-10	280	358	1.3	1.4	<QL	<QL	0.6
10-Apr-10	453	469	1.7	1.8	<QL	<QL	0.7
10-May-10	133	201	0.9	1.3	<QL	<QL	0.7
10-Jun-10	92	126	0.6	1	<QL	<QL	0.6
10-Jul-10	54	90	0.4	0.7	<QL	<QL	0.6
10-Aug-10	75	196	0.6	1.5	<QL	<QL	0.6
10-Sep-10	70	209	0.4	1.2	<QL	<QL	0.5
10-Oct-10	111	<QL	0.4	<QL	<QL	<QL	0.7
10-Nov-10	26	27	0.1	0.2	<QL	<QL	0.7
10-Dec-10	39	<QL	0.2	<QL	<QL	<QL	0.6
10-Jan-11	58	<QL	0.1	<QL	<QL	<QL	0.8
10-Feb-11	24	105	0.2	0.9	<QL	<QL	0.7
10-Mar-11	72	112	0.5	0.8	<QL	<QL	0.8
10-Apr-11	552	**2037**	1.9	5.8	<QL	<QL	0.6
10-May-11	270	452	1.1	1.7	<QL	<QL	0.7
10-Jun-11	34	79	0.2	0.4	<QL	<QL	0.7
10-Jul-11	74	130	0.6	1	<QL	<QL	0.6
10-Aug-11	38	68	0.3	0.5	<QL	<QL	0.6
10-Sep-11	11	16	0.1	0.2	<QL	<QL	0.5
10-Oct-11	207	838	0.8	2.9	<QL	<QL	0.6
10-Nov-11	22	42	0.2	0.4	<QL	<QL	0.6
10-Dec-11	88	<QL	0.2	<QL	<QL	<QL	0.7
10-Jan-12	149	549	0.4	1.2	<QL	<QL	0.8
10-Feb-12	5	21	0.03	0.1	<QL	<QL	0.6
10-Mar-12	26	106	0.1	0.6	<QL	<QL	0.6
10-Apr-12	107	104	0.5	0.6	<QL	<QL	0.7
10-May-12	60	137	0.4	0.8	<QL	<QL	0.8
10-Jun-12	33	124	0.2	0.8	<QL	<QL	0.6
10-Jul-12	<QL	<QL	<QL	<QL	<QL	<QL	0.6
10-Aug-12	<QL	<QL	<QL	<QL	<QL	<QL	0.5
10-Sep-12	<QL	<QL	<QL	<QL	<QL	<QL	0.6
10-Oct-12	19	48	0.2	0.4	<QL	<QL	0.7
10-Nov-12	19	30	0.2	0.3	<QL	<QL	0.7
10-Dec-12	<QL	<QL	<QL	<QL	<QL	<QL	0.6
10-Jan-13	55	93	0.5	0.7	<QL	<QL	0.5
10-Feb-13	563	**1825**	1.9	5.5	<QL	<QL	0.7
10-Mar-13	198	161	1.2	1	<QL	<QL	0.4
10-Apr-13	67	133	0.4	0.8	<QL	<QL	0.4
10-May-13	94	202	0.4	0.6	<QL	<QL	**0.1**
10-Jun-13	180	762	0.5	2.1	<QL	<QL	0.8
10-Jul-13	67	286	0.2	0.9	<QL	<QL	0.7
10-Aug-13	349	1036	0.9	2.6	<QL	<QL	0.7
10-Sep-13	<QL	<QL	<QL	<QL	<QL	<QL	0.7

Western Virginia Water Authority WPCP
VA0025020 (Outfall 001)

Due Date	TSS				TRC		TRC Contact
	Quantity Average (kg/d)	Quantity Max (kg/d)	Conc Average (mg/L)	Conc Max (mg/L)	Conc Average (mg/L)	Conc Max (mg/L)	Min (mg/L)
55 MGD Limits	**1040**	**1561**	**5.0**	**1.0**	**0.0028**	**0.0034**	**0.50**
10-Oct-13	<QL	<QL	<QL	<QL	<QL	<QL	0.7
10-Nov-13	15	64	0.05	0.2	<QL	<QL	0.7

WVWA WPCP
VA0025020
Outfall 001

Quantifiable Effluent Data (Nonmetals)

Parameter	2/13/2012	4/4/2013	5/29/2013	6/27/2013	7/29/2013
bromodichloromethane (µg/L)	<10	3.3	14.3	4.3	4.5
chloroform (µg/L)	18.7	14.9	17.0	12.5	11.9
dibromochloromethane	<10	<1.0	2.7	1.2	<1.0
nitrate-nitrite, nitrogen (mg/L)		9.10	12.1		9.00
total dissolved solids (mg/L)		359	349		346

238(62)

Attachment N

Wasteload and Limit Calculations – 55 MGD

- **Mixing Zone Output (MIXER 2.1)**
- **Summary of 90th Percentile and Mean Values**
- **Antidegradation Wasteload Allocation Spreadsheets**
- **Summary of Ammonia, Chloride, Metals and TRC AWLAs**
- **Comparison of Existing TKN and Proposed Ammonia Limits**
- **STATS Program Results**
  (ammonia, chloride, Cu, Pb, Ni, TRC, Zn)

Mixing Zone Predictions for WVWA WPCP

Effluent Flow = 55 MGD
Stream 7Q10 = 26 MGD
Stream 30Q10 = 33 MGD
Stream 1Q10 = 23 MGD
Stream slope = 0.0005 ft/ft
Stream width = 74 ft
Bottom scale = 4
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 3.362 ft
Length = 1411.38 ft
Velocity = .504 ft/sec
Residence Time = .0324 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 3.5396 ft
Length = 1348.16 ft
Velocity = .5201 ft/sec
Residence Time = .03 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 3.2842 ft
Length = 1441.05 ft
Velocity = .4968 ft/sec
Residence Time = .8057 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

WVWA WPCP
VA0025020

Summary of 90th Percentile and Mean Values

Effluent

90th Percentile pH	7.2 S.U.
10th Percentile pH	6.9 S.U.
90th Percentile Temperature	22.2 °C
90th Percentile Temperature (Jan. -May)	17.4 °C
Mean Hardness	193 mg/L

Upstream STORET Station Data (4AROA202.20)

90th Percentile pH	8.4 S.U.
10th Percentile pH	7.6 S.U.
90th Percentile Temperature	24.9 °C
90th Percentile Temperature (Jan. -May)	17.4 °C
Mean Hardness	155 mg/L

* 14th Street Bridge above WVWA WPCP outfall 001

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: WVWA WPCP (55 MGD) (acute metal AWLAs) Permit No.: VA0025020

Receiving Stream: Roanoke River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	155	mg/L
90% Temperature (Annual) =	24.9	deg C
90% Temperature (Wet season) =	17.4	deg C
90% Maximum pH =	8.4	SU
10% Maximum pH =	7.6	SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	23	MGD
7Q10 (Annual) =	26	MGD
30Q10 (Annual) =	33	MGD
1Q10 (Wet season) =	45	MGD
30Q10 (Wet season)	70	MGD
30Q5 =	39	MGD
Harmonic Mean =	99	MGD

Mixing Information

Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	193	mg/L
90% Temp (Annual) =	22.2	deg C
90% Temp (Wet season) =	17.4	deg C
90% Maximum pH =	7.2	SU
10% Maximum pH =	6.9	SU
Discharge Flow =	55	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.7E+03	--	--	na	9.9E+01	--	--	na	1.7E+02	--	--	**na**	**1.7E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.6E+01	--	--	na	9.3E-01	--	--	na	1.6E+00	--	--	**na**	**1.6E+00**
Acrylonitrile[c]	0	--	--	na	2.5E+00	--	--	na	7.0E+00	--	--	na	2.5E-01	--	--	na	7.0E-01	--	--	**na**	**7.0E-01**
Aldrin [c]	0	3.0E+00	--	na	5.0E-04	4.3E+00	--	na	1.4E-03	7.5E-01	--	na	5.0E-05	1.1E+00	--	na	1.4E-04	**1.1E+00**	--	**na**	**1.4E-04**
Ammonia-N (mg/l) (Yearly)	0.044508	2.49E+01	2.73E+00	na	--	3.5E+01	4.3E+00	na	--	6.26E+00	7.15E-01	na	--	8.9E+00	1.1E+00	na	--	**8.9E+00**	**1.1E+00**	**na**	--
Ammonia-N (mg/l) (High Flow)	0.044508	2.18E+01	3.55E+00	na	--	4.0E+01	8.0E+00	na	--	5.48E+00	9.21E-01	na	--	9.9E+00	2.0E+00	na	--	**9.9E+00**	**2.0E+00**	**na**	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	6.8E+04	--	--	na	4.0E+03	--	--	na	6.8E+03	--	--	**na**	**6.8E+03**
Antimony	0	--	--	na	6.4E+02	--	--	na	1.1E+03	--	--	na	6.4E+01	--	--	na	1.1E+02	--	--	**na**	**1.1E+02**
Arsenic	0.64	3.4E+02	1.5E+02	na	--	4.8E+02	2.2E+02	na	--	8.5E+01	3.8E+01	na	--	1.2E+02	5.6E+01	na	--	**1.2E+02**	**5.6E+01**	**na**	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	--
Benzene [c]	0	--	--	na	5.1E+02	--	--	na	1.4E+03	--	--	na	5.1E+01	--	--	na	1.4E+02	--	--	**na**	**1.4E+02**
Benzidine[c]	0	--	--	na	2.0E-03	--	--	na	5.6E-03	--	--	na	2.0E-04	--	--	na	5.6E-04	--	--	**na**	**5.6E-04**
Benzo (a) anthracene[c]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	**na**	**5.0E-02**
Benzo (b) fluoranthene[c]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	**na**	**5.0E-02**
Benzo (k) fluoranthene[c]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	**na**	**5.0E-02**
Benzo (a) pyrene[c]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	**na**	**5.0E-02**
Bis2-Chloroethyl Ether[c]	0	--	--	na	5.3E+00	--	--	na	1.5E+01	--	--	na	5.3E-01	--	--	na	1.5E+00	--	--	**na**	**1.5E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.1E+05	--	--	na	6.5E+03	--	--	na	1.1E+04	--	--	**na**	**1.1E+04**
Bis 2-Ethylhexyl Phthalate[c]	0	--	--	na	2.2E+01	--	--	na	6.2E+01	--	--	na	2.2E+00	--	--	na	6.2E+00	--	--	**na**	**6.2E+00**
Bromoform [c]	0	--	--	na	1.4E+03	--	--	na	3.9E+03	--	--	na	1.4E+02	--	--	na	3.9E+02	--	--	**na**	**3.9E+02**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.2E+03	--	--	na	1.9E+02	--	--	na	3.2E+02	--	--	**na**	**3.2E+02**
Cadmium	0.26	7.7E+00	1.8E+00	na	--	1.1E+01	2.5E+00	na	--	2.1E+00	6.5E-01	na	--	2.9E+00	8.3E-01	na	--	**2.9E+00**	**8.3E-01**	**na**	--
Carbon Tetrachloride[c]	0	--	--	na	1.6E+01	--	--	na	4.5E+01	--	--	na	1.6E+00	--	--	na	4.5E+00	--	--	**na**	**4.5E+00**
Chlordane [c]	0	2.4E+00	4.3E-03	na	8.1E-03	3.4E+00	6.3E-03	na	2.3E-02	6.0E-01	1.1E-03	na	8.1E-04	8.5E-01	1.6E-03	na	2.3E-03	**8.5E-01**	**1.6E-03**	**na**	**2.3E-03**
Chloride	47952.27	8.6E+05	2.3E+05	na	--	1.2E+06	3.2E+05	na	--	2.5E+05	9.3E+04	na	--	3.4E+05	1.1E+05	na	--	**3.4E+05**	**1.1E+05**	**na**	--
TRC	0	1.9E+01	1.1E+01	na	--	2.7E+01	1.6E+01	na	--	4.8E+00	2.8E+00	na	--	6.7E+00	4.1E+00	na	--	**6.7E+00**	**4.1E+00**	**na**	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	2.7E+03	--	--	na	1.6E+02	--	--	na	2.7E+02	--	--	**na**	**2.7E+02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	3.6E+02	--	--	na	1.3E+01	--	--	na	3.6E+01	--	--	na	**3.6E+01**
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.9E+04	--	--	na	1.1E+03	--	--	na	1.9E+03	--	--	na	**1.9E+03**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	2.7E+03	--	--	na	1.6E+02	--	--	na	2.7E+02	--	--	na	**2.7E+02**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.6E+02	--	--	na	1.5E+01	--	--	na	2.6E+01	--	--	na	**2.6E+01**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.2E-01	6.0E-02	na	--	2.1E-02	1.0E-02	na	--	2.9E-02	1.5E-02	na	--	**2.9E-02**	**1.5E-02**	na	--
Chromium III	0	9.3E+02	1.2E+02	na	--	1.3E+03	1.8E+02	na	--	2.3E+02	3.0E+01	na	--	3.3E+02	4.4E+01	na	--	**3.3E+02**	**4.4E+01**	na	--
Chromium VI	0.29	1.6E+01	1.1E+01	na	--	2.3E+01	1.6E+01	na	--	4.2E+00	3.0E+00	na	--	5.9E+00	4.2E+00	na	--	**5.9E+00**	**4.2E+00**	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.7E+01	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	1.8E-03	--	--	na	5.0E-03	--	--	na	**5.0E-03**
Copper	2.52	2.4E+01	1.5E+01	na	--	3.2E+01	2.1E+01	na	--	7.8E+00	5.6E+00	na	--	1.0E+01	7.1E+00	na	--	**1.0E+01**	**7.1E+00**	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	3.1E+01	7.7E+00	na	2.7E+04	5.5E+00	1.3E+00	na	1.6E+03	7.8E+00	1.9E+00	na	2.7E+03	**7.8E+00**	**1.9E+00**	na	**2.7E+03**
DDD[C]	0	--	--	na	3.1E-03	--	--	na	8.7E-03	--	--	na	3.1E-04	--	--	na	8.7E-04	--	--	na	**8.7E-04**
DDE[C]	0	--	--	na	2.2E-03	--	--	na	6.2E-03	--	--	na	2.2E-04	--	--	na	6.2E-04	--	--	na	**6.2E-04**
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.6E+00	1.5E-03	na	6.2E-03	2.8E-01	2.5E-04	na	2.2E-04	3.9E-01	3.7E-04	na	6.2E-04	**3.9E-01**	**3.7E-04**	na	**6.2E-04**
Demeton	0	--	1.0E-01	na	--	--	1.5E-01	na	--	--	2.5E-02	na	--	--	3.7E-02	na	--	--	**3.7E-02**	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	2.4E-01	2.5E-01	na	--	4.3E-02	4.3E-02	na	--	6.0E-02	6.3E-02	na	--	**6.0E-02**	**6.3E-02**	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	**5.0E-02**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.2E+03	--	--	na	1.3E+02	--	--	na	2.2E+02	--	--	na	**2.2E+02**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.6E+03	--	--	na	9.6E+01	--	--	na	1.6E+02	--	--	na	**1.6E+02**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.2E+02	--	--	na	1.9E+01	--	--	na	3.2E+01	--	--	na	**3.2E+01**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	7.8E-01	--	--	na	2.8E-02	--	--	na	7.8E-02	--	--	na	**7.8E-02**
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	4.8E+02	--	--	na	1.7E+01	--	--	na	4.8E+01	--	--	na	**4.8E+01**
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	1.0E+03	--	--	na	3.7E+01	--	--	na	1.0E+02	--	--	na	**1.0E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.2E+04	--	--	na	7.1E+02	--	--	na	1.2E+03	--	--	na	**1.2E+03**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.7E+04	--	--	na	1.0E+03	--	--	na	1.7E+03	--	--	na	**1.7E+03**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.0E+02	--	--	na	2.9E+01	--	--	na	5.0E+01	--	--	na	**5.0E+01**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	4.2E+02	--	--	na	1.5E+01	--	--	na	4.2E+01	--	--	na	**4.2E+01**
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	5.9E+02	--	--	na	2.1E+01	--	--	na	5.9E+01	--	--	na	**5.9E+01**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	3.4E-01	8.2E-02	na	1.5E-03	6.0E-02	1.4E-02	na	5.4E-05	8.5E-02	2.1E-02	na	1.5E-04	**8.5E-02**	**2.1E-02**	na	**1.5E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	7.5E+04	--	--	na	4.4E+03	--	--	na	7.5E+03	--	--	na	**7.5E+03**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.5E+03	--	--	na	8.5E+01	--	--	na	1.5E+02	--	--	na	**1.5E+02**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.9E+06	--	--	na	1.1E+05	--	--	na	1.9E+05	--	--	na	**1.9E+05**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	7.7E+03	--	--	na	4.5E+02	--	--	na	7.7E+02	--	--	na	**7.7E+02**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	9.1E+03	--	--	na	5.3E+02	--	--	na	9.1E+02	--	--	na	**9.1E+02**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	4.8E+02	--	--	na	2.8E+01	--	--	na	4.8E+01	--	--	na	**4.8E+01**
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	9.5E+01	--	--	na	3.4E+00	--	--	na	9.5E+00	--	--	na	**9.5E+00**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	8.7E-08	--	--	na	5.1E-09	--	--	na	8.7E-09	--	--	na	**8.7E-09**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	5.6E+00	--	--	na	2.0E-01	--	--	na	5.6E-01	--	--	na	**5.6E-01**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.1E-01	8.2E-02	na	1.5E+02	5.5E-02	1.4E-02	na	8.9E+00	7.8E-02	2.1E-02	na	1.5E+01	**7.8E-02**	**2.1E-02**	na	**1.5E+01**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.1E-01	8.2E-02	na	1.5E+02	5.5E-02	1.4E-02	na	8.9E+00	7.8E-02	2.1E-02	na	1.5E+01	**7.8E-02**	**2.1E-02**	na	**1.5E+01**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	3.1E-01	8.2E-02	--	--	5.5E-02	1.4E-02	--	--	7.8E-02	2.1E-02	--	--	**7.8E-02**	**2.1E-02**	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.5E+02	--	--	na	8.9E+00	--	--	na	1.5E+01	--	--	na	**1.5E+01**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.2E-01	5.3E-02	na	1.0E-01	2.2E-02	9.0E-03	na	6.0E-03	3.0E-02	1.3E-02	na	1.0E-02	**3.0E-02**	**1.3E-02**	na	**1.0E-02**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	5.1E-01	--	--	na	3.0E-02	--	--	na	5.1E-02	--	--	na	**5.1E-02**

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Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.6E+03	--	--	na	2.1E+02	--	--	na	3.6E+02	--	--	na	**3.6E+02**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.4E+02	--	--	na	1.4E+01	--	--	na	2.4E+01	--	--	na	**2.4E+01**
Fluorene	0	--	--	na	5.3E+03	--	--	na	9.1E+03	--	--	na	5.3E+02	--	--	na	9.1E+02	--	--	na	**9.1E+02**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.5E-02	na	--	--	2.5E-03	na	--	--	3.7E-03	na	--	--	**3.7E-03**	na	--
Heptachlor[C]	0	5.2E-01	3.8E-03	na	7.9E-04	7.4E-01	5.6E-03	na	2.2E-03	1.3E-01	9.5E-04	na	7.9E-05	1.8E-01	1.4E-03	na	2.2E-04	**1.8E-01**	**1.4E-03**	na	**2.2E-04**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	7.4E-01	5.6E-03	na	1.1E-03	1.3E-01	9.5E-04	na	3.9E-05	1.8E-01	1.4E-03	na	1.1E-04	**1.8E-01**	**1.4E-03**	na	**1.1E-04**
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	8.1E-03	--	--	na	2.9E-04	--	--	na	8.1E-04	--	--	na	**8.1E-04**
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	5.0E+02	--	--	na	1.8E+01	--	--	na	5.0E+01	--	--	na	**5.0E+01**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	1.4E-01	--	--	na	4.9E-03	--	--	na	1.4E-02	--	--	na	**1.4E-02**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	4.8E-01	--	--	na	1.7E-02	--	--	na	4.8E-02	--	--	na	**4.8E-02**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.3E+00	--	na	5.0E+00	2.4E-01	--	na	1.8E-01	3.4E-01	--	na	5.0E-01	**3.4E-01**	--	na	**5.0E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.9E+03	--	--	na	1.1E+02	--	--	na	1.9E+02	--	--	na	**1.9E+02**
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	9.2E+01	--	--	na	3.3E+00	--	--	na	9.2E+00	--	--	na	**9.2E+00**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.9E+00	na	--	--	5.0E-01	na	--	--	7.4E-01	na	--	--	**7.4E-01**	na	--
Indeno (1,2,3-cd) pyrene[C]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	**5.0E-02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	2.7E+04	--	--	na	9.6E+02	--	--	na	2.7E+03	--	--	na	**2.7E+03**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Lead	2.09	2.5E+02	2.9E+01	na	--	3.6E+02	4.1E+01	na	--	6.5E+01	8.7E+00	na	--	9.2E+01	1.2E+01	na	--	**9.2E+01**	**1.2E+01**	na	--
Malathion	0	--	1.0E-01	na	--	--	1.5E-01	na	--	--	2.5E-02	na	--	--	3.7E-02	na	--	--	**3.7E-02**	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0.081	1.4E+00	7.7E-01	--	--	2.0E+00	1.1E+00	--	--	4.1E-01	2.5E-01	--	--	5.5E-01	3.3E-01	--	--	**5.5E-01**	**3.3E-01**	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.6E+03	--	--	na	1.5E+02	--	--	na	2.6E+02	--	--	na	**2.6E+02**
Methylene Chloride[C]	0	--	--	na	5.9E+03	--	--	na	1.7E+04	--	--	na	5.9E+02	--	--	na	1.7E+03	--	--	na	**1.7E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	4.4E-02	na	--	--	7.5E-03	na	--	--	1.1E-02	na	--	--	**1.1E-02**	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Nickel	4.77	3.0E+02	3.3E+01	na	4.6E+03	4.3E+02	4.7E+01	na	7.9E+03	7.9E+01	1.2E+01	na	4.6E+02	1.1E+02	1.5E+01	na	7.9E+02	**1.1E+02**	**1.5E+01**	na	**7.9E+02**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.2E+03	--	--	na	6.9E+01	--	--	na	1.2E+02	--	--	na	**1.2E+02**
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	8.4E+01	--	--	na	3.0E+00	--	--	na	8.4E+00	--	--	na	**8.4E+00**
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	1.7E+02	--	--	na	6.0E+00	--	--	na	1.7E+01	--	--	na	**1.7E+01**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	1.4E+01	--	--	na	5.1E-01	--	--	na	1.4E+00	--	--	na	**1.4E+00**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	4.0E+01	9.7E+00	na	--	7.0E+00	1.7E+00	--	--	9.9E+00	2.4E+00	--	--	**9.9E+00**	**2.4E+00**	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	9.2E-02	1.9E-02	na	--	1.6E-02	3.3E-03	na	--	2.3E-02	4.8E-03	na	--	**2.3E-02**	**4.8E-03**	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	2.1E-02	na	1.8E-03	--	3.5E-03	na	6.4E-05	--	5.2E-03	na	1.8E-04	--	**5.2E-03**	na	**1.8E-04**
Pentachlorophenol[C]	0	8.9E+00	6.9E+00	na	3.0E+01	1.3E+01	1.0E+01	na	8.4E+01	2.2E+00	1.7E+00	na	3.0E+00	3.1E+00	2.5E+00	na	8.4E+00	**3.1E+00**	**2.5E+00**	na	**8.4E+00**
Phenol	0	--	--	na	8.6E+05	--	--	na	1.5E+06	--	--	na	8.6E+04	--	--	na	1.5E+05	--	--	na	**1.5E+05**
Pyrene	0	--	--	na	4.0E+03	--	--	na	6.8E+03	--	--	na	4.0E+02	--	--	na	6.8E+02	--	--	na	**6.8E+02**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	6.8E+00	--	--	na	4.0E-01	--	--	na	6.8E-01	--	--	na	**6.8E-01**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

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Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0.828	2.0E+01	5.0E+00	na	4.2E+03	2.8E+01	7.0E+00	na	7.2E+03	5.6E+00	1.9E+00	na	4.2E+02	7.6E+00	2.4E+00	na	7.2E+02	**7.6E+00**	**2.4E+00**	**na**	**7.2E+02**
Silver	1.103	9.6E+00	--	na	--	1.3E+01	--	na	--	3.2E+00	--	na	--	4.1E+00	--	na	--	**4.1E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	1.1E+02	--	--	na	4.0E+00	--	--	na	1.1E+01	**--**	**--**	**na**	**1.1E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	9.2E+01	--	--	na	3.3E+00	--	--	na	9.2E+00	**--**	**--**	**na**	**9.2E+00**
Thallium	0	--	--	na	4.7E-01	--	--	na	8.0E-01	--	--	na	4.7E-02	--	--	na	8.0E-02	**--**	**--**	**na**	**8.0E-02**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.0E+04	--	--	na	6.0E+02	--	--	na	1.0E+03	**--**	**--**	**na**	**1.0E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene[C]	0	7.3E-01	2.0E-04	na	2.8E-03	1.0E+00	2.9E-04	na	7.8E-03	1.8E-01	5.0E-05	na	2.8E-04	2.6E-01	7.4E-05	na	7.8E-04	**2.6E-01**	**7.4E-05**	**na**	**7.8E-04**
Tributyltin	0	4.6E-01	7.2E-02	na	--	6.5E-01	1.1E-01	na	--	1.2E-01	1.8E-02	na	--	1.6E-01	2.7E-02	na	--	**1.6E-01**	**2.7E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.2E+02	--	--	na	7.0E+00	--	--	na	1.2E+01	**--**	**--**	**na**	**1.2E+01**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	4.5E+02	--	--	na	1.6E+01	--	--	na	4.5E+01	**--**	**--**	**na**	**4.5E+01**
Trichloroethylene[C]	0	--	--	na	3.0E+02	--	--	na	8.4E+02	--	--	na	3.0E+01	--	--	na	8.4E+01	**--**	**--**	**na**	**8.4E+01**
2,4,6-Trichlorophenol[C]	0	--	--	na	2.4E+01	--	--	na	6.7E+01	--	--	na	2.4E+00	--	--	na	6.7E+00	**--**	**--**	**na**	**6.7E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	6.7E+01	--	--	na	2.4E+00	--	--	na	6.7E+00	**--**	**--**	**na**	**6.7E+00**
Zinc	19.31	1.9E+02	2.0E+02	na	2.6E+04	2.7E+02	2.8E+02	na	4.4E+04	6.3E+01	6.3E+01	na	2.6E+03	8.1E+01	8.4E+01	na	4.5E+03	**8.1E+01**	**8.4E+01**	**na**	**4.5E+03**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.1E+02
Arsenic	3.3E+01
Barium	na
Cadmium	5.0E-01
Chromium III	2.7E+01
Chromium VI	2.3E+00
Copper	4.0E+00
Iron	na
Lead	7.1E+00
Manganese	na
Mercury	2.0E-01
Nickel	9.2E+00
Selenium	1.4E+00
Silver	1.7E+00
Zinc	3.3E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

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55.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 55.000

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	78.000	100.000
7Q10	26.000	N/A	81.000	N/A
30Q10	33.000	70.000	88.000	125.000
30Q5	39.000	N/A	94.000	N/A
Harm. Mean	99.000	N/A	154.000	N/A
Annual Avg.	0.000	N/A	55.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.996	17.400
30Q10 90th% Temp. Mix (deg C)	23.213	17.400
1Q10 90th% pH Mix (SU)	7.340	7.438
30Q10 90th% pH Mix (SU)	7.388	7.523
1Q10 10th% pH Mix (SU)	7.017	N/A
7Q10 10th% pH Mix (SU)	7.029	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	181.8	181.8
7Q10 Hardness (mg/L as CaCO3)	180.8	180.8

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.340
(7.204 - pH)	-0.136
(pH - 7.204)	0.136
Trout Present Criterion (mg N/l	16.621
Trout Absent Criterion (mg N/L	24.889
Trout Present?	n
Effective Criterion (mg N/L)	24.889

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.213
90th Percentile pH (SU)	7.388
MIN	1.627
MAX	23.213
(7.688 - pH)	0.300
(pH - 7.688)	-0.300
Early LS Present Criterion (mg N	2.727
Early LS Absent Criterion (mg N/	2.727
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.727

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.438
(7.204 - pH)	-0.234
(pH - 7.204)	0.234
Trout Present Criterion (mg N/l	14.548
Trout Absent Criterion (mg N/L	21.785
Trout Present?	n
Effective Criterion (mg N/L)	21.785

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.523
MIN	2.367
MAX	17.400
(7.688 - pH)	0.165
(pH - 7.688)	-0.165
Early LS Present Criterion (mg N	3.551
Early LS Absent Criterion (mg N/	3.551
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.551

55.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 55.000

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	78.000	100.000
7Q10	26.000	N/A	81.000	N/A
30Q10	33.000	70.000	88.000	125.000
30Q5	39.000	N/A	94.000	N/A
Harm. Mean	99.000	N/A	154.000	N/A
Annual Avg.	0.000	N/A	55.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.996	17.400
30Q10 90th% Temp. Mix (deg C)	23.213	17.400
1Q10 90th% pH Mix (SU)	7.340	7.438
30Q10 90th% pH Mix (SU)	7.388	7.523
1Q10 10th% pH Mix (SU)	7.017	N/A
7Q10 10th% pH Mix (SU)	7.029	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	181.795	181.795
7Q10 Hardness (mg/L as CaCO3) =	180.802	180.802

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.340
(7.204 - pH)	-0.136
(pH - 7.204)	0.136
Trout Present Criterion (mg N/l	16.621
Trout Absent Criterion (mg N/L	24.889
Trout Present?	n
Effective Criterion (mg N/L)	24.889

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.213
90th Percentile pH (SU)	7.388
MIN	1.627
MAX	23.213
(7.688 - pH)	0.300
(pH - 7.688)	-0.300
Early LS Present Criterion (mg N	2.727
Early LS Absent Criterion (mg N/	2.727
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.727

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.438
(7.204 - pH)	-0.234
(pH - 7.204)	0.234
Trout Present Criterion (mg N/l	14.548
Trout Absent Criterion (mg N/L	21.785
Trout Present?	n
Effective Criterion (mg N/L)	21.785

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.523
MIN	2.367
MAX	17.400
(7.688 - pH)	0.165
(pH - 7.688)	-0.165
Early LS Present Criterion (mg N	3.551
Early LS Absent Criterion (mg N/	3.551
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.551

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FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: WVWA WPCP (55 MGD) (chronic metal AWLAs) Permit No.: VA0025020

Receiving Stream: Roanoke River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		
Mean Hardness (as CaCO3) =	155	mg/L
90% Temperature (Annual) =	24.9	deg C
90% Temperature (Wet season) =	17.4	deg C
90% Maximum pH =	8.4	SU
10% Maximum pH =	7.6	SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows		
1Q10 (Annual) =	23	MGD
7Q10 (Annual) =	26	MGD
30Q10 (Annual) =	33	MGD
1Q10 (Wet season) =	45	MGD
30Q10 (Wet season)	70	MGD
30Q5 =	39	MGD
Harmonic Mean =	99	MGD

Mixing Information		
Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information		
Mean Hardness (as CaCO3) =	193	mg/L
90% Temp (Annual) =	22.2	deg C
90% Temp (Wet season) =	17.4	deg C
90% Maximum pH =	7.2	SU
10% Maximum pH =	6.9	SU
Discharge Flow =	55	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.7E+03	--	--	na	9.9E+01	--	--	na	1.7E+02	--	--	na	**1.7E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.6E+01	--	--	na	9.3E-01	--	--	na	1.6E+00	--	--	na	**1.6E+00**
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	7.0E+00	--	--	na	2.5E-01	--	--	na	7.0E-01	--	--	na	**7.0E-01**
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	4.3E+00	--	na	1.4E-03	7.5E-01	--	na	5.0E-05	1.1E+00	--	na	1.4E-04	**1.1E+00**	--	na	**1.4E-04**
Ammonia-N (mg/l) (Yearly)	0.044508	2.49E+01	2.73E+00	na	--	3.5E+01	4.3E+00	na	--	6.26E+00	7.15E-01	na	--	8.9E+00	1.1E+00	na	--	**8.9E+00**	**1.1E+00**	na	--
Ammonia-N (mg/l) (High Flow)	0.044508	2.18E+01	3.55E+00	na	--	4.0E+01	8.0E+00	na	--	5.48E+00	9.21E-01	na	--	9.9E+00	2.0E+00	na	--	**9.9E+00**	**2.0E+00**	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	6.8E+04	--	--	na	4.0E+03	--	--	na	6.8E+03	--	--	na	**6.8E+03**
Antimony	0	--	--	na	6.4E+02	--	--	na	1.1E+03	--	--	na	6.4E+01	--	--	na	1.1E+02	--	--	na	**1.1E+02**
Arsenic	0.64	3.4E+02	1.5E+02	na	--	4.8E+02	2.2E+02	na	--	8.5E+01	3.8E+01	na	--	1.2E+02	5.6E+01	na	--	**1.2E+02**	**5.6E+01**	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	1.4E+03	--	--	na	5.1E+01	--	--	na	1.4E+02	--	--	na	**1.4E+02**
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	5.6E-03	--	--	na	2.0E-04	--	--	na	5.6E-04	--	--	na	**5.6E-04**
Benzo (a) anthracene[C]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	**5.0E-02**
Benzo (b) fluoranthene[C]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	**5.0E-02**
Benzo (k) fluoranthene[C]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	**5.0E-02**
Benzo (a) pyrene[C]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	**5.0E-02**
Bis2-Chloroethyl Ether[C]	0	--	--	na	5.3E+00	--	--	na	1.5E+01	--	--	na	5.3E-01	--	--	na	1.5E+00	--	--	na	**1.5E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.1E+05	--	--	na	6.5E+03	--	--	na	1.1E+04	--	--	na	**1.1E+04**
Bis 2-Ethylhexyl Phthalate[C]	0	--	--	na	2.2E+01	--	--	na	6.2E+01	--	--	na	2.2E+00	--	--	na	6.2E+00	--	--	na	**6.2E+00**
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	3.9E+03	--	--	na	1.4E+02	--	--	na	3.9E+02	--	--	na	**3.9E+02**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.2E+03	--	--	na	1.9E+02	--	--	na	3.2E+02	--	--	na	**3.2E+02**
Cadmium	0.25	7.7E+00	1.8E+00	na	--	1.1E+01	2.5E+00	na	--	2.1E+00	6.4E-01	na	--	2.9E+00	8.2E-01	na	--	**2.9E+00**	**8.2E-01**	na	--
Carbon Tetrachloride[C]	0	--	--	na	1.6E+01	--	--	na	4.5E+01	--	--	na	1.6E+00	--	--	na	4.5E+00	--	--	na	**4.5E+00**
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	3.4E+00	6.3E-03	na	2.3E-02	6.0E-01	1.1E-03	na	8.1E-04	8.5E-01	1.6E-03	na	2.3E-03	**8.5E-01**	**1.6E-03**	na	**2.3E-03**
Chloride	46251.86	8.6E+05	2.3E+05	na	--	1.2E+06	3.2E+05	na	--	2.5E+05	9.2E+04	na	--	3.3E+05	1.1E+05	na	--	**3.3E+05**	**1.1E+05**	na	--
TRC	0	1.9E+01	1.1E+01	na	--	2.7E+01	1.6E+01	na	--	4.8E+00	2.8E+00	na	--	6.7E+00	4.1E+00	na	--	**6.7E+00**	**4.1E+00**	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	2.7E+03	--	--	na	1.6E+02	--	--	na	2.7E+02	--	--	na	**2.7E+02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	3.6E+02	--	--	na	1.3E+01	--	--	na	3.6E+01	--	--	**na**	**3.6E+01**
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.9E+04	--	--	na	1.1E+03	--	--	na	1.9E+03	--	--	**na**	**1.9E+03**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	2.7E+03	--	--	na	1.6E+02	--	--	na	2.7E+02	--	--	**na**	**2.7E+02**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.6E+02	--	--	na	1.5E+01	--	--	na	2.6E+01	--	--	**na**	**2.6E+01**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.2E-01	6.0E-02	na	--	2.1E-02	1.0E-02	na	--	2.9E-02	1.5E-02	na	--	**2.9E-02**	**1.5E-02**	**na**	**--**
Chromium III	0	9.3E+02	1.2E+02	na	--	1.3E+03	1.8E+02	na	--	2.3E+02	3.0E+01	na	--	3.3E+02	4.4E+01	na	--	**3.3E+02**	**4.4E+01**	**na**	**--**
Chromium VI	0.276	1.6E+01	1.1E+01	na	--	2.3E+01	1.6E+01	na	--	4.2E+00	3.0E+00	na	--	5.9E+00	4.2E+00	na	--	**5.9E+00**	**4.2E+00**	**na**	**--**
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.7E+01	--	--	--	**na**	**--**
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	na	1.8E-03	--	--	na	5.0E-03	--	--	**na**	**5.0E-03**
Copper	2.49	2.4E+01	1.5E+01	na	--	3.2E+01	2.1E+01	na	--	7.8E+00	5.6E+00	na	--	1.0E+01	7.0E+00	na	--	**1.0E+01**	**7.0E+00**	**na**	**--**
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	3.1E+01	7.7E+00	na	2.7E+04	5.5E+00	1.3E+00	na	1.6E+03	7.8E+00	1.9E+00	na	2.7E+03	**7.8E+00**	**1.9E+00**	**na**	**2.7E+03**
DDD[C]	0	--	--	na	3.1E-03	--	--	na	8.7E-03	--	--	na	3.1E-04	--	--	na	8.7E-04	--	--	**na**	**8.7E-04**
DDE[C]	0	--	--	na	2.2E-03	--	--	na	6.2E-03	--	--	na	2.2E-04	--	--	na	6.2E-04	--	--	**na**	**6.2E-04**
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.6E+00	1.5E-03	na	6.2E-03	2.8E-01	2.5E-04	na	2.2E-04	3.9E-01	3.7E-04	na	6.2E-04	**3.9E-01**	**3.7E-04**	**na**	**6.2E-04**
Demeton	0	--	1.0E-01	na	--	--	1.5E-01	na	--	--	2.5E-02	na	--	--	3.7E-02	na	--	--	**3.7E-02**	**na**	**--**
Diazinon	0	1.7E-01	1.7E-01	na	--	2.4E-01	2.5E-01	na	--	4.3E-02	4.3E-02	na	--	6.0E-02	6.3E-02	na	--	**6.0E-02**	**6.3E-02**	**na**	**--**
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	**na**	**5.0E-02**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.2E+03	--	--	na	1.3E+02	--	--	na	2.2E+02	--	--	**na**	**2.2E+02**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.6E+03	--	--	na	9.6E+01	--	--	na	1.6E+02	--	--	**na**	**1.6E+02**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.2E+02	--	--	na	1.9E+01	--	--	na	3.2E+01	--	--	**na**	**3.2E+01**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	7.8E-01	--	--	na	2.8E-02	--	--	na	7.8E-02	--	--	**na**	**7.8E-02**
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	4.8E+02	--	--	na	1.7E+01	--	--	na	4.8E+01	--	--	**na**	**4.8E+01**
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	1.0E+03	--	--	na	3.7E+01	--	--	na	1.0E+02	--	--	**na**	**1.0E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.2E+04	--	--	na	7.1E+02	--	--	na	1.2E+03	--	--	**na**	**1.2E+03**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.7E+04	--	--	na	1.0E+03	--	--	na	1.7E+03	--	--	**na**	**1.7E+03**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.0E+02	--	--	na	2.9E+01	--	--	na	5.0E+01	--	--	**na**	**5.0E+01**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	4.2E+02	--	--	na	1.5E+01	--	--	na	4.2E+01	--	--	**na**	**4.2E+01**
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	5.9E+02	--	--	na	2.1E+01	--	--	na	5.9E+01	--	--	**na**	**5.9E+01**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	3.4E-01	8.2E-02	na	1.5E-03	6.0E-02	1.4E-02	na	5.4E-05	8.5E-02	2.1E-02	na	1.5E-04	**8.5E-02**	**2.1E-02**	**na**	**1.5E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	7.5E+04	--	--	na	4.4E+03	--	--	na	7.5E+03	--	--	**na**	**7.5E+03**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.5E+03	--	--	na	8.5E+01	--	--	na	1.5E+02	--	--	**na**	**1.5E+02**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.9E+06	--	--	na	1.1E+05	--	--	na	1.9E+05	--	--	**na**	**1.9E+05**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	7.7E+03	--	--	na	4.5E+02	--	--	na	7.7E+02	--	--	**na**	**7.7E+02**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	9.1E+03	--	--	na	5.3E+02	--	--	na	9.1E+02	--	--	**na**	**9.1E+02**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	4.8E+02	--	--	na	2.8E+01	--	--	na	4.8E+01	--	--	**na**	**4.8E+01**
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	9.5E+01	--	--	na	3.4E+00	--	--	na	9.5E+00	--	--	**na**	**9.5E+00**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	8.7E-08	--	--	na	5.1E-09	--	--	na	8.7E-09	--	--	**na**	**8.7E-09**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	5.6E+00	--	--	na	2.0E-01	--	--	na	5.6E-01	--	--	**na**	**5.6E-01**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.1E-01	8.2E-02	na	1.5E+02	5.5E-02	1.4E-02	na	8.9E+00	7.8E-02	2.1E-02	na	1.5E+01	**7.8E-02**	**2.1E-02**	**na**	**1.5E+01**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.1E-01	8.2E-02	na	1.5E+02	5.5E-02	1.4E-02	na	8.9E+00	7.8E-02	2.1E-02	na	1.5E+01	**7.8E-02**	**2.1E-02**	**na**	**1.5E+01**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	3.1E-01	8.2E-02	--	--	5.5E-02	1.4E-02	--	--	7.8E-02	2.1E-02	--	--	**7.8E-02**	**2.1E-02**	**--**	**--**
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.5E+02	--	--	na	8.9E+00	--	--	na	1.5E+01	--	--	**na**	**1.5E+01**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.2E-01	5.3E-02	na	1.0E-01	2.2E-02	9.0E-03	na	6.0E-03	3.0E-02	1.3E-02	na	1.0E-02	**3.0E-02**	**1.3E-02**	**na**	**1.0E-02**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	5.1E-01	--	--	na	3.0E-02	--	--	na	5.1E-02	--	--	**na**	**5.1E-02**

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Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.6E+03	--	--	na	2.1E+02	--	--	na	3.6E+02	--	--	**na**	**3.6E+02**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.4E+02	--	--	na	1.4E+01	--	--	na	2.4E+01	--	--	**na**	**2.4E+01**
Fluorene	0	--	--	na	5.3E+03	--	--	na	9.1E+03	--	--	na	5.3E+02	--	--	na	9.1E+02	--	--	**na**	**9.1E+02**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.5E-02	na	--	--	2.5E-03	na	--	--	3.7E-03	na	--	--	**3.7E-03**	**na**	**--**
Heptachlor[c]	0	5.2E-01	3.8E-03	na	7.9E-04	7.4E-01	5.6E-03	na	2.2E-03	1.3E-01	9.5E-04	na	7.9E-05	1.8E-01	1.4E-03	na	2.2E-04	**1.8E-01**	**1.4E-03**	**na**	**2.2E-04**
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	7.4E-01	5.6E-03	na	1.1E-03	1.3E-01	9.5E-04	na	3.9E-05	1.8E-01	1.4E-03	na	1.1E-04	**1.8E-01**	**1.4E-03**	**na**	**1.1E-04**
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	8.1E-03	--	--	na	2.9E-04	--	--	na	8.1E-04	--	--	**na**	**8.1E-04**
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	5.0E+02	--	--	na	1.8E+01	--	--	na	5.0E+01	--	--	**na**	**5.0E+01**
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	1.4E-01	--	--	na	4.9E-03	--	--	na	1.4E-02	--	--	**na**	**1.4E-02**
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	4.8E-01	--	--	na	1.7E-02	--	--	na	4.8E-02	--	--	**na**	**4.8E-02**
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.3E+00	--	na	5.0E+00	2.4E-01	--	na	1.8E-01	3.4E-01	--	na	5.0E-01	**3.4E-01**	--	**na**	**5.0E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.9E+03	--	--	na	1.1E+02	--	--	na	1.9E+02	--	--	**na**	**1.9E+02**
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	9.2E+01	--	--	na	3.3E+00	--	--	na	9.2E+00	--	--	**na**	**9.2E+00**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.9E+00	na	--	--	5.0E-01	na	--	--	7.4E-01	na	--	--	**7.4E-01**	**na**	**--**
Indeno (1,2,3-cd) pyrene[c]	0	--	--	na	1.8E-01	--	--	na	5.0E-01	--	--	na	1.8E-02	--	--	na	5.0E-02	--	--	**na**	**5.0E-02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	2.7E+04	--	--	na	9.6E+02	--	--	na	2.7E+03	--	--	**na**	**2.7E+03**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	**na**	**--**
Lead	2.09	2.5E+02	2.9E+01	na	--	3.6E+02	4.1E+01	na	--	6.5E+01	8.7E+00	na	--	9.2E+01	1.2E+01	na	--	**9.2E+01**	**1.2E+01**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.5E-01	na	--	--	2.5E-02	na	--	--	3.7E-02	na	--	--	**3.7E-02**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
Mercury	0.081	1.4E+00	7.7E-01	--	--	2.0E+00	1.1E+00	--	--	4.1E-01	2.5E-01	--	--	5.5E-01	3.3E-01	--	--	**5.5E-01**	**3.3E-01**	**--**	**--**
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.6E+03	--	--	na	1.5E+02	--	--	na	2.6E+02	--	--	**na**	**2.6E+02**
Methylene Chloride[c]	0	--	--	na	5.9E+03	--	--	na	1.7E+04	--	--	na	5.9E+02	--	--	na	1.7E+03	--	--	**na**	**1.7E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	4.4E-02	na	--	--	7.5E-03	na	--	--	1.1E-02	na	--	--	**1.1E-02**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	**na**	**--**
Nickel	4.6	3.0E+02	3.3E+01	na	4.6E+03	4.3E+02	4.7E+01	na	7.9E+03	7.9E+01	1.2E+01	na	4.6E+02	1.1E+02	1.5E+01	na	7.9E+02	**1.1E+02**	**1.5E+01**	**na**	**7.9E+02**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.2E+03	--	--	na	6.9E+01	--	--	na	1.2E+02	--	--	**na**	**1.2E+02**
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	8.4E+01	--	--	na	3.0E+00	--	--	na	8.4E+00	--	--	**na**	**8.4E+00**
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	1.7E+02	--	--	na	6.0E+00	--	--	na	1.7E+01	--	--	**na**	**1.7E+01**
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	1.4E+01	--	--	na	5.1E-01	--	--	na	1.4E+00	--	--	**na**	**1.4E+00**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	4.0E+01	9.7E+00	na	--	7.0E+00	1.7E+00	--	--	9.9E+00	2.4E+00	--	--	**9.9E+00**	**2.4E+00**	**na**	**--**
Parathion	0	6.5E-02	1.3E-02	na	--	9.2E-02	1.9E-02	na	--	1.6E-02	3.3E-03	na	--	2.3E-02	4.8E-03	na	--	**2.3E-02**	**4.8E-03**	**na**	**--**
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	2.1E-02	na	1.8E-03	--	3.5E-03	na	6.4E-05	--	5.2E-03	na	1.8E-04	--	**5.2E-03**	**na**	**1.8E-04**
Pentachlorophenol[c]	0	8.9E+00	6.9E+00	na	3.0E+01	1.3E+01	1.0E+01	na	8.4E+01	2.2E+00	1.7E+00	na	3.0E+00	3.1E+00	2.5E+00	na	8.4E+00	**3.1E+00**	**2.5E+00**	**na**	**8.4E+00**
Phenol	0	--	--	na	8.6E+05	--	--	na	1.5E+06	--	--	na	8.6E+04	--	--	na	1.5E+05	--	--	**na**	**1.5E+05**
Pyrene	0	--	--	na	4.0E+03	--	--	na	6.8E+03	--	--	na	4.0E+02	--	--	na	6.8E+02	--	--	**na**	**6.8E+02**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	6.8E+00	--	--	na	4.0E-01	--	--	na	6.8E-01	--	--	**na**	**6.8E-01**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	**--**

2 of 8

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0.835	2.0E+01	5.0E+00	na	4.2E+03	2.8E+01	7.0E+00	na	7.2E+03	5.6E+00	1.9E+00	na	4.2E+02	7.6E+00	2.4E+00	na	7.2E+02	**7.6E+00**	**2.4E+00**	**na**	**7.2E+02**
Silver	1.057	9.6E+00	--	na	--	1.3E+01	--	na	--	3.2E+00	--	na	--	4.1E+00	--	na	--	**4.1E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[c]	0	--	--	na	4.0E+01	--	--	na	1.1E+02	--	--	na	4.0E+00	--	--	na	1.1E+01	**--**	**--**	**na**	**1.1E+01**
Tetrachloroethylene[c]	0	--	--	na	3.3E+01	--	--	na	9.2E+01	--	--	na	3.3E+00	--	--	na	9.2E+00	**--**	**--**	**na**	**9.2E+00**
Thallium	0	--	--	na	4.7E-01	--	--	na	8.0E-01	--	--	na	4.7E-02	--	--	na	8.0E-02	**--**	**--**	**na**	**8.0E-02**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.0E+04	--	--	na	6.0E+02	--	--	na	1.0E+03	**--**	**--**	**na**	**1.0E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene[c]	0	7.3E-01	2.0E-04	na	2.8E-03	1.0E+00	2.9E-04	na	7.8E-03	1.8E-01	5.0E-05	na	2.8E-04	2.6E-01	7.4E-05	na	7.8E-04	**2.6E-01**	**7.4E-05**	**na**	**7.8E-04**
Tributyltin	0	4.6E-01	7.2E-02	na	--	6.5E-01	1.1E-01	na	--	1.2E-01	1.8E-02	na	--	1.6E-01	2.7E-02	na	--	**1.6E-01**	**2.7E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.2E+02	--	--	na	7.0E+00	--	--	na	1.2E+01	**--**	**--**	**na**	**1.2E+01**
1,1,2-Trichloroethane[c]	0	--	--	na	1.6E+02	--	--	na	4.5E+02	--	--	na	1.6E+01	--	--	na	4.5E+01	**--**	**--**	**na**	**4.5E+01**
Trichloroethylene[c]	0	--	--	na	3.0E+02	--	--	na	8.4E+02	--	--	na	3.0E+01	--	--	na	8.4E+01	**--**	**--**	**na**	**8.4E+01**
2,4,6-Trichlorophenol[c]	0	--	--	na	2.4E+01	--	--	na	6.7E+01	--	--	na	2.4E+00	--	--	na	6.7E+00	**--**	**--**	**na**	**6.7E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[c]	0	--	--	na	2.4E+01	--	--	na	6.7E+01	--	--	na	2.4E+00	--	--	na	6.7E+00	**--**	**--**	**na**	**6.7E+00**
Zinc	18.45	1.9E+02	2.0E+02	na	2.6E+04	2.7E+02	2.8E+02	na	4.4E+04	6.2E+01	6.3E+01	na	2.6E+03	8.1E+01	8.4E+01	na	4.5E+03	**8.1E+01**	**8.4E+01**	**na**	**4.5E+03**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.1E+02
Arsenic	3.3E+01
Barium	na
Cadmium	4.9E-01
Chromium III	2.7E+01
Chromium VI	2.3E+00
Copper	4.0E+00
Iron	na
Lead	7.1E+00
Manganese	na
Mercury	2.0E-01
Nickel	9.1E+00
Selenium	1.4E+00
Silver	1.6E+00
Zinc	3.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

55.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 55.000

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	78.000	100.000
7Q10	26.000	N/A	81.000	N/A
30Q10	33.000	70.000	88.000	125.000
30Q5	39.000	N/A	94.000	N/A
Harm. Mean	99.000	N/A	154.000	N/A
Annual Avg.	0.000	N/A	55.000	N/A

Stream/Discharge Mix Values	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.996	17.400
30Q10 90th% Temp. Mix (deg C)	23.213	17.400
1Q10 90th% pH Mix (SU)	7.340	7.438
30Q10 90th% pH Mix (SU)	7.388	7.523
1Q10 10th% pH Mix (SU)	7.017	N/A
7Q10 10th% pH Mix (SU)	7.029	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	181.8	181.8
7Q10 Hardness (mg/L as CaCO3)	180.8	180.8

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.340
(7.204 - pH)	-0.136
(pH - 7.204)	0.136
Trout Present Criterion (mg N/l	16.621
Trout Absent Criterion (mg N/L	24.889
Trout Present?	n
Effective Criterion (mg N/L)	24.889

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.213
90th Percentile pH (SU)	7.388
MIN	1.627
MAX	23.213
(7.688 - pH)	0.300
(pH - 7.688)	-0.300
Early LS Present Criterion (mg N	2.727
Early LS Absent Criterion (mg N/	2.727
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.727

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.438
(7.204 - pH)	-0.234
(pH - 7.204)	0.234
Trout Present Criterion (mg N/l	14.548
Trout Absent Criterion (mg N/L	21.785
Trout Present?	n
Effective Criterion (mg N/L)	21.785

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.523
MIN	2.367
MAX	17.400
(7.688 - pH)	0.165
(pH - 7.688)	-0.165
Early LS Present Criterion (mg N	3.551
Early LS Absent Criterion (mg N/	3.551
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.551

55.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 55.000

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	78.000	100.000
7Q10	26.000	N/A	81.000	N/A
30Q10	33.000	70.000	88.000	125.000
30Q5	39.000	N/A	94.000	N/A
Harm. Mean	99.000	N/A	154.000	N/A
Annual Avg.	0.000	N/A	55.000	N/A

Stream/Discharge Mix Values	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.996	17.400
30Q10 90th% Temp. Mix (deg C)	23.213	17.400
1Q10 90th% pH Mix (SU)	7.340	7.438
30Q10 90th% pH Mix (SU)	7.388	7.523
1Q10 10th% pH Mix (SU)	7.017	N/A
7Q10 10th% pH Mix (SU)	7.029	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	181.795	181.795
7Q10 Hardness (mg/L as CaCO3) =	180.802	180.802

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.340
(7.204 - pH)	-0.136
(pH - 7.204)	0.136
Trout Present Criterion (mg N/l	16.621
Trout Absent Criterion (mg N/L	24.889
Trout Present?	n
Effective Criterion (mg N/L)	24.889

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.213
90th Percentile pH (SU)	7.388
MIN	1.627
MAX	23.213
(7.688 - pH)	0.300
(pH - 7.688)	-0.300
Early LS Present Criterion (mg N	2.727
Early LS Absent Criterion (mg N/	2.727
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.727

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.438
(7.204 - pH)	-0.234
(pH - 7.204)	0.234
Trout Present Criterion (mg N/l	14.548
Trout Absent Criterion (mg N/L	21.785
Trout Present?	n
Effective Criterion (mg N/L)	21.785

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.523
MIN	2.367
MAX	17.400
(7.688 - pH)	0.165
(pH - 7.688)	-0.165
Early LS Present Criterion (mg N	3.551
Early LS Absent Criterion (mg N/	3.551
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.551

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(25)

WVWA WPCP
Outfall 001
VA0025020

Summary of AWLAs
(Ammonia, Metals, Organics, TRC above QLs)
55 MGD Facility

Parameter	Acute AWLA (µg/L)	Chronic AWLA (µg/L)	Human Health (µg/L)
ammonia as N (yearly) (mg/L)	8.9	1.1	
ammonia as N (high flow) (mg/L)	9.9	2.0	
chloride	340,000	110,000	
chloroform			1900
chlorodibromomethane			36
copper, dissolved	10	7.1	
dichlorobromomethane			48
lead, dissolved	92	12	
nickel, dissolved	110	15	
total residual chlorine (mg/L)	0.0067	0.0041	
zinc, dissolved	81	84	

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(76)

WVWA WPCP
VA0025020
Outfall 001

Comparison of Existing TKN Limits and Ammonia Limits Needed (55 MGD Facility)

Month	Monthly Average			Weekly Average		
	TKN Limit Required by WQMP Model (TKN-3.0) (mg/L)	Ammonia Limit Needed from STATS (mg/L)	TKN Limit Needed	TKN Limit Required by WQMP Model (TKN-3.0) (mg/L)	Ammonia Limit Needed from STATS (mg/L)	TKN Limit Needed
April	**2.0 (-1.0)***	2.2	2.0	**3.0 (0.0)***	3.0	3.0
May	**2.0 (-1.0)***	2.2	2.0	**3.0 (0.0)***	3.0	3.0
June	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
July	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
Aug	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
Sep	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
Oct	**4.0 (1.0)***	1.2	4.0	5.0 (2.0)*	**1.6**	4.6
Nov	**4.0 (1.0)***	1.2	4.0	5.0 (2.0)*	**1.6**	4.6
Dec	**4.0 (1.0)***	1.2	4.0	5.0 (2.0)*	**1.6**	4.6
Jan	**4.0 (1.0)***	2.2	4.0	**5.0 (2.0)***	3.0	5.0
Feb	**4.0 (1.0)***	2.2	4.0	**5.0 (2.0)***	3.0	5.0
Mar	**4.0 (1.0)***	2.2	4.0	**5.0 (2.0)***	3.0	5.0

Notes:
Most stringent concentration limit highlighted in yellow.
Assumed TKN = ammonia conc. + 3.0 mg/L
* (Equivalent ammonia concentration calculated from TKN limits and given in parenthesis.
Values of 0 and -1 mg/L are not reflective of an actual ammonia concentration.)
They are screening values as per Guidance Memorandum 00-2011.

TKN Tiers Needed Jan. - Mar., Apr. - Sept., Oct. - Dec.

The equivalent ammonia concentration was compared with the ammonia limit needed from STATS program.
The more stringent of the two number was expressed as a TKN limit for the permit.

253
(77)

12/3/2013 12:22:35 PM

Facility = WVWA WPCP (55 MGD)
Chemical = ammonia (mg/L) (Jan. - May) high flow
Chronic averaging period = 30
WLAa = 9.9
WLAc = 2
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.03534018683262
Average Weekly limit = 2.95162415669945
Average Monthly LImit = 2.19857420580709

The data are:

9

12/3/2013 12:23:15 PM

Facility = WVWA WPCP (55 MGD)
Chemical = ammonia (mg/L) (June - Dec.) low flow
Chronic averaging period = 30
WLAa = 8.9
WLAc = 1.1
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 2.21943710275794
Average Weekly limit = 1.6233932861847
Average Monthly LImit = 1.2092158131939

The data are:

9

9/4/2013 11:23:33 AM

Facility = WVWA WPCP (55 MGD)
Chemical = chloride (mg/L)
Chronic averaging period = 4
WLAa = 340000
WLAc = 110000
Q.L. = 5000
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 10
Expected Value = 81623.6
Variance = 2380630
C.V. = 0.189029
97th percentile daily values = 114092.
97th percentile 4 day average = 97033.8
97th percentile 30 day average= 86922.4
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

70000
70000
76000
93000
86000
90000
96000
95000
85000
53000

12/11/2013 10:07:55 AM

Facility = WVWA WPCP (55 MGD)
Chemical = copper, dissolved (ug/L)
Chronic averaging period = 4
WLAa = 10
WLAc = 7
Q.L. = 0.5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 10
Expected Value = 4.35813
Variance = 2.74712
C.V. = 0.380311
97th percentile daily values = 8.13232
97th percentile 4 day average = 6.10308
97th percentile 30 day average= 4.92733
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

3.9
3.27
4.03
4.17
3.23
2.92
3.03
5.1
10.3
3.91

12/11/2013 10:51:55 AM

Facility = WVWA WPCP (55 MGD)
Chemical = lead, total (ug/L)
Chronic averaging period = 4
WLAa = 92
WLAc = 12
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = .22
Variance = .017424
C.V. = 0.6
97th percentile daily values = .535351
97th percentile 4 day average = .366033
97th percentile 30 day average= .265331
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

0.34
0.14
0.18

12/11/2013 10:53:57 AM

Facility = WVWA WPCP (55 MGD)
Chemical = nickel, total (ug/L)
Chronic averaging period = 4
WLAa = 110
WLAc = 15
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = 2.43
Variance = 2.12576
C.V. = 0.6
97th percentile daily values = 5.91320
97th percentile 4 day average = 4.04301
97th percentile 30 day average= 2.93070
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1.66
2.17
3.46

1/14/2014 9:36:19 AM

Facility = WVWA WPCP (55 MGD)
Chemical = TRC (mg/L)
Chronic averaging period = 4
WLAa = 0.0067
WLAc = 0.0041
Q.L. = 0.1
# samples/mo. = 360
# samples/wk. = 90

Summary of Statistics:

observations = 1
Expected Value = 1000
Variance = 360000
C.V. = 0.6
97th percentile daily values = 2433.41
97th percentile 4 day average = 1663.79
97th percentile 30 day average= 1206.05
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 5.99655661461825E-03
Average Weekly limit = 2.76969973570186E-03 0.0028
Average Monthly LImit = 2.61083286528402E-03 0.0026

The data are:

1000

11/27/2013 10:45:24 AM

Facility = WVWA WPCP (55 MGD)
Chemical = zinc, dissolved (ug/L)
Chronic averaging period = 4
WLAa = 81
WLAc = 84
Q.L. = 10
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 22.3
Variance = 179.024
C.V. = 0.6
97th percentile daily values = 54.2652
97th percentile 4 day average = 37.1025
97th percentile 30 day average= 26.8949
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

22.3

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Attachment O

Wasteload and Limit Calculations – 62 MGD

- **Mixing Zone Output (MIXER 2.1)**
- **Summary of 90th Percentile and Mean Values**
- **Antidegradation Wasteload Allocation Spreadsheets**
- **Summary of Ammonia, Chloride, Metals, and TRC AWLAs**
- **Comparison of Existing TKN and Proposed Ammonia Limits**
- **STATS Program Results**
  (ammonia, chloride, Cu, Pb, Ni, TRC, Zn)

2602
(86)

Mixing Zone Predictions for WVWA WPCP

Effluent Flow = 62 MGD
Stream 7Q10 = 26 MGD
Stream 30Q10 = 33 MGD
Stream 1Q10 = 23 MGD
Stream slope = 0.0005 ft/ft
Stream width = 74 ft
Bottom scale = 4
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 3.5396 ft
Length = 1348.16 ft
Velocity = .5201 ft/sec
Residence Time = .03 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 3.7123 ft
Length = 1292.03 ft
Velocity = .5353 ft/sec
Residence Time = .0279 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 3.4641 ft
Length = 1374.3 ft
Velocity = .5133 ft/sec
Residence Time = .7437 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

263
(82)

WVWA WPCP
VA0025020

Summary of 90th Percentile and Mean Values

Effluent

90th Percentile pH	7.2 S.U.
10th Percentile pH	6.9 S.U.
90th Percentile Temperature	22.2 °C
90th Percentile Temperature (Jan. -May)	17.4 °C
Mean Hardness	193 mg/L

Upstream STORET Station Data (4AROA202.20)

90th Percentile pH	8.4 S.U.
10th Percentile pH	7.6 S.U.
90th Percentile Temperature	24.9 °C
90th Percentile Temperature (Jan. -May)	17.4 °C
Mean Hardness	155 mg/L

* 14th Street Bridge above WVWA WPCP outfall 001

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: WVWA WPCP (62 MGD) (acute metal AWLAs) Permit No.: VA0025020

Receiving Stream: Roanoke River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	155	mg/L
90% Temperature (Annual) =	24.9	deg C
90% Temperature (Wet season) =	17.4	deg C
90% Maximum pH =	8.4	SU
10% Maximum pH =	7.6	SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	23	MGD
7Q10 (Annual) =	26	MGD
30Q10 (Annual) =	33	MGD
1Q10 (Wet season) =	45	MGD
30Q10 (Wet season)	70	MGD
30Q5 =	39	MGD
Harmonic Mean =	99	MGD

Mixing Information

Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	193	mg/L
90% Temp (Annual) =	22.2	deg C
90% Temp (Wet season) =	17.4	deg C
90% Maximum pH =	7.2	SU
10% Maximum pH =	6.9	SU
Discharge Flow =	62	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.6E+03	--	--	na	9.9E+01	--	--	na	1.6E+02	--	--	na	**1.6E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.5E+01	--	--	na	9.3E-01	--	--	na	1.5E+00	--	--	na	**1.5E+00**
Acrylonitrile[c]	0	--	--	na	2.5E+00	--	--	na	6.5E+00	--	--	na	2.5E-01	--	--	na	6.5E-01	--	--	na	**6.5E-01**
Aldrin [c]	0	3.0E+00	--	na	5.0E-04	4.1E+00	--	na	1.3E-03	7.5E-01	--	na	5.0E-05	1.0E+00	--	na	1.3E-04	**1.0E+00**	--	na	**1.3E-04**
Ammonia-N (mg/l) (Yearly)	0.044508	2.53E+01	2.77E+00	na	--	3.5E+01	4.2E+00	na	--	6.37E+00	7.27E-01	na	--	8.7E+00	1.1E+00	na	--	**8.7E+00**	**1.1E+00**	na	--
Ammonia-N (mg/l) (High Flow)	0.044508	2.24E+01	3.63E+00	na	--	3.9E+01	7.7E+00	na	--	5.64E+00	9.41E-01	na	--	9.7E+00	2.0E+00	na	--	**9.7E+00**	**2.0E+00**	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	6.5E+04	--	--	na	4.0E+03	--	--	na	6.5E+03	--	--	na	**6.5E+03**
Antimony	0	--	--	na	6.4E+02	--	--	na	1.0E+03	--	--	na	6.4E+01	--	--	na	1.0E+02	--	--	na	**1.0E+02**
Arsenic	0.64	3.4E+02	1.5E+02	na	--	4.7E+02	2.1E+02	na	--	8.5E+01	3.8E+01	na	--	1.2E+02	5.4E+01	na	--	**1.2E+02**	**5.4E+01**	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene [c]	0	--	--	na	5.1E+02	--	--	na	1.3E+03	--	--	na	5.1E+01	--	--	na	1.3E+02	--	--	na	**1.3E+02**
Benzidine[c]	0	--	--	na	2.0E-03	--	--	na	5.2E-03	--	--	na	2.0E-04	--	--	na	5.2E-04	--	--	na	**5.2E-04**
Benzo (a) anthracene[c]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	**4.7E-02**
Benzo (b) fluoranthene[c]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	**4.7E-02**
Benzo (k) fluoranthene[c]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	**4.7E-02**
Benzo (a) pyrene[c]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	**4.7E-02**
Bis2-Chloroethyl Ether[c]	0	--	--	na	5.3E+00	--	--	na	1.4E+01	--	--	na	5.3E-01	--	--	na	1.4E+00	--	--	na	**1.4E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.1E+05	--	--	na	6.5E+03	--	--	na	1.1E+04	--	--	na	**1.1E+04**
Bis 2-Ethylhexyl Phthalate[c]	0	--	--	na	2.2E+01	--	--	na	5.7E+01	--	--	na	2.2E+00	--	--	na	5.7E+00	--	--	na	**5.7E+00**
Bromoform [c]	0	--	--	na	1.4E+03	--	--	na	3.6E+03	--	--	na	1.4E+02	--	--	na	3.6E+02	--	--	na	**3.6E+02**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.1E+03	--	--	na	1.9E+02	--	--	na	3.1E+02	--	--	na	**3.1E+02**
Cadmium	0.26	7.7E+00	1.8E+00	na	--	1.1E+01	2.5E+00	na	--	2.1E+00	6.5E-01	na	--	2.8E+00	8.1E-01	na	--	**2.8E+00**	**8.1E-01**	na	--
Carbon Tetrachloride[c]	0	--	--	na	1.6E+01	--	--	na	4.2E+01	--	--	na	1.6E+00	--	--	na	4.2E+00	--	--	na	**4.2E+00**
Chlordane [c]	0	2.4E+00	4.3E-03	na	8.1E-03	3.3E+00	6.1E-03	na	2.1E-02	6.0E-01	1.1E-03	na	8.1E-04	8.2E-01	1.5E-03	na	2.1E-03	**8.2E-01**	**1.5E-03**	na	**2.1E-03**
Chloride	47952.27	8.6E+05	2.3E+05	na	--	1.2E+06	3.1E+05	na	--	2.5E+05	9.3E+04	na	--	3.3E+05	1.1E+05	na	--	**3.3E+05**	**1.1E+05**	na	--
TRC	0	1.9E+01	1.1E+01	na	--	2.6E+01	1.6E+01	na	--	4.8E+00	2.8E+00	na	--	6.5E+00	3.9E+00	na	--	**6.5E+00**	**3.9E+00**	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	2.6E+03	--	--	na	1.6E+02	--	--	na	2.6E+02	--	--	na	**2.6E+02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	3.4E+02	--	--	na	1.3E+01	--	--	na	3.4E+01	--	--	na	**3.4E+01**
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.8E+04	--	--	na	1.1E+03	--	--	na	1.8E+03	--	--	na	**1.8E+03**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	2.6E+03	--	--	na	1.6E+02	--	--	na	2.6E+02	--	--	na	**2.6E+02**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.4E+02	--	--	na	1.5E+01	--	--	na	2.4E+01	--	--	na	**2.4E+01**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.1E-01	5.8E-02	na	--	2.1E-02	1.0E-02	na	--	2.8E-02	1.5E-02	na	--	**2.8E-02**	**1.5E-02**	na	--
Chromium III	0	9.3E+02	1.2E+02	na	--	1.3E+03	1.7E+02	na	--	2.3E+02	3.0E+01	na	--	3.2E+02	4.3E+01	na	--	**3.2E+02**	**4.3E+01**	na	--
Chromium VI	0.29	1.6E+01	1.1E+01	na	--	2.2E+01	1.5E+01	na	--	4.2E+00	3.0E+00	na	--	5.7E+00	4.1E+00	na	--	**5.7E+00**	**4.1E+00**	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.6E+01	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	1.8E-03	--	--	na	4.7E-03	--	--	na	**4.7E-03**
Copper	2.52	2.4E+01	1.5E+01	na	--	3.2E+01	2.0E+01	na	--	7.8E+00	5.6E+00	na	--	9.8E+00	6.9E+00	na	--	**9.8E+00**	**6.9E+00**	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	3.0E+01	7.4E+00	na	2.6E+04	5.5E+00	1.3E+00	na	1.6E+03	7.5E+00	1.8E+00	na	2.6E+03	**7.5E+00**	**1.8E+00**	na	**2.6E+03**
DDD[C]	0	--	--	na	3.1E-03	--	--	na	8.1E-03	--	--	na	3.1E-04	--	--	na	8.1E-04	--	--	na	**8.1E-04**
DDE[C]	0	--	--	na	2.2E-03	--	--	na	5.7E-03	--	--	na	2.2E-04	--	--	na	5.7E-04	--	--	na	**5.7E-04**
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.5E+00	1.4E-03	na	5.7E-03	2.8E-01	2.5E-04	na	2.2E-04	3.8E-01	3.5E-04	na	5.7E-04	**3.8E-01**	**3.5E-04**	na	**5.7E-04**
Demeton	0	--	1.0E-01	na	--	--	1.4E-01	na	--	--	2.5E-02	na	--	--	3.5E-02	na	--	--	**3.5E-02**	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	2.3E-01	2.4E-01	na	--	4.3E-02	4.3E-02	na	--	5.8E-02	6.0E-02	na	--	**5.8E-02**	**6.0E-02**	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	**4.7E-02**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.1E+03	--	--	na	1.3E+02	--	--	na	2.1E+02	--	--	na	**2.1E+02**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.6E+03	--	--	na	9.6E+01	--	--	na	1.6E+02	--	--	na	**1.6E+02**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.1E+02	--	--	na	1.9E+01	--	--	na	3.1E+01	--	--	na	**3.1E+01**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	7.3E-01	--	--	na	2.8E-02	--	--	na	7.3E-02	--	--	na	**7.3E-02**
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	4.4E+02	--	--	na	1.7E+01	--	--	na	4.4E+01	--	--	na	**4.4E+01**
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	9.6E+02	--	--	na	3.7E+01	--	--	na	9.6E+01	--	--	na	**9.6E+01**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.2E+04	--	--	na	7.1E+02	--	--	na	1.2E+03	--	--	na	**1.2E+03**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.6E+04	--	--	na	1.0E+03	--	--	na	1.6E+03	--	--	na	**1.6E+03**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	4.7E+02	--	--	na	2.9E+01	--	--	na	4.7E+01	--	--	na	**4.7E+01**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	3.9E+02	--	--	na	1.5E+01	--	--	na	3.9E+01	--	--	na	**3.9E+01**
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	5.5E+02	--	--	na	2.1E+01	--	--	na	5.5E+01	--	--	na	**5.5E+01**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	3.3E-01	7.9E-02	na	1.4E-03	6.0E-02	1.4E-02	na	5.4E-05	8.2E-02	2.0E-02	na	1.4E-04	**8.2E-02**	**2.0E-02**	na	**1.4E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	7.2E+04	--	--	na	4.4E+03	--	--	na	7.2E+03	--	--	na	**7.2E+03**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.4E+03	--	--	na	8.5E+01	--	--	na	1.4E+02	--	--	na	**1.4E+02**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.8E+06	--	--	na	1.1E+05	--	--	na	1.8E+05	--	--	na	**1.8E+05**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	7.3E+03	--	--	na	4.5E+02	--	--	na	7.3E+02	--	--	na	**7.3E+02**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	8.6E+03	--	--	na	5.3E+02	--	--	na	8.6E+02	--	--	na	**8.6E+02**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	4.6E+02	--	--	na	2.8E+01	--	--	na	4.6E+01	--	--	na	**4.6E+01**
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	8.8E+01	--	--	na	3.4E+00	--	--	na	8.8E+00	--	--	na	**8.8E+00**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	8.3E-08	--	--	na	5.1E-09	--	--	na	8.3E-09	--	--	na	**8.3E-09**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	5.2E+00	--	--	na	2.0E-01	--	--	na	5.2E-01	--	--	na	**5.2E-01**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.0E-01	7.9E-02	na	1.4E+02	5.5E-02	1.4E-02	na	8.9E+00	7.5E-02	2.0E-02	na	1.4E+01	**7.5E-02**	**2.0E-02**	na	**1.4E+01**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.0E-01	7.9E-02	na	1.4E+02	5.5E-02	1.4E-02	na	8.9E+00	7.5E-02	2.0E-02	na	1.4E+01	**7.5E-02**	**2.0E-02**	na	**1.4E+01**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	3.0E-01	7.9E-02	--	--	5.5E-02	1.4E-02	--	--	7.5E-02	2.0E-02	--	--	**7.5E-02**	**2.0E-02**	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.4E+02	--	--	na	8.9E+00	--	--	na	1.4E+01	--	--	na	**1.4E+01**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.2E-01	5.1E-02	na	9.8E-02	2.2E-02	9.0E-03	na	6.0E-03	2.9E-02	1.3E-02	na	9.8E-03	**2.9E-02**	**1.3E-02**	na	**9.8E-03**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	4.9E-01	--	--	na	3.0E-02	--	--	na	4.9E-02	--	--	na	**4.9E-02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.4E+03	--	--	na	2.1E+02	--	--	na	3.4E+02	**--**	**--**	**na**	**3.4E+02**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.3E+02	--	--	na	1.4E+01	--	--	na	2.3E+01	**--**	**--**	**na**	**2.3E+01**
Fluorene	0	--	--	na	5.3E+03	--	--	na	8.6E+03	--	--	na	5.3E+02	--	--	na	8.6E+02	**--**	**--**	**na**	**8.6E+02**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.4E-02	na	--	--	2.5E-03	na	--	--	3.5E-03	na	--	**--**	**3.5E-03**	**na**	**--**
Heptachlor[c]	0	5.2E-01	3.8E-03	na	7.9E-04	7.1E-01	5.4E-03	na	2.1E-03	1.3E-01	9.5E-04	na	7.9E-05	1.8E-01	1.3E-03	na	2.1E-04	**1.8E-01**	**1.3E-03**	**na**	**2.1E-04**
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	7.1E-01	5.4E-03	na	1.0E-03	1.3E-01	9.5E-04	na	3.9E-05	1.8E-01	1.3E-03	na	1.0E-04	**1.8E-01**	**1.3E-03**	**na**	**1.0E-04**
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	7.5E-03	--	--	na	2.9E-04	--	--	na	7.5E-04	**--**	**--**	**na**	**7.5E-04**
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	4.7E+02	--	--	na	1.8E+01	--	--	na	4.7E+01	**--**	**--**	**na**	**4.7E+01**
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	1.3E-01	--	--	na	4.9E-03	--	--	na	1.3E-02	**--**	**--**	**na**	**1.3E-02**
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	4.4E-01	--	--	na	1.7E-02	--	--	na	4.4E-02	**--**	**--**	**na**	**4.4E-02**
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.3E+00	--	na	4.7E+00	2.4E-01	--	na	1.8E-01	3.3E-01	--	na	4.7E-01	**3.3E-01**	**--**	**na**	**4.7E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.8E+03	--	--	na	1.1E+02	--	--	na	1.8E+02	**--**	**--**	**na**	**1.8E+02**
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	8.6E+01	--	--	na	3.3E+00	--	--	na	8.6E+00	**--**	**--**	**na**	**8.6E+00**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.8E+00	na	--	--	5.0E-01	na	--	--	7.1E-01	na	--	**--**	**7.1E-01**	**na**	**--**
Indeno (1,2,3-cd) pyrene[c]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	**--**	**--**	**na**	**4.7E-02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	2.5E+04	--	--	na	9.6E+02	--	--	na	2.5E+03	**--**	**--**	**na**	**2.5E+03**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	**--**	**0.0E+00**	**na**	**--**
Lead	2.09	2.6E+02	2.9E+01	na	--	3.5E+02	4.0E+01	na	--	6.6E+01	8.8E+00	na	--	8.9E+01	1.2E+01	na	--	**8.9E+01**	**1.2E+01**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.4E-01	na	--	--	2.5E-02	na	--	--	3.5E-02	na	--	**--**	**3.5E-02**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Mercury	0.081	1.4E+00	7.7E-01	--	--	1.9E+00	1.1E+00	--	--	4.1E-01	2.5E-01	--	--	5.3E-01	3.3E-01	--	--	**5.3E-01**	**3.3E-01**	**--**	**--**
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.4E+03	--	--	na	1.5E+02	--	--	na	2.4E+02	**--**	**--**	**na**	**2.4E+02**
Methylene Chloride[c]	0	--	--	na	5.9E+03	--	--	na	1.5E+04	--	--	na	5.9E+02	--	--	na	1.5E+03	**--**	**--**	**na**	**1.5E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	4.3E-02	na	--	--	7.5E-03	na	--	--	1.1E-02	na	--	**--**	**1.1E-02**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	**--**	**0.0E+00**	**na**	**--**
Nickel	4.77	3.0E+02	3.4E+01	na	4.6E+03	4.1E+02	4.6E+01	na	7.5E+03	7.9E+01	1.2E+01	na	4.6E+02	1.1E+02	1.5E+01	na	7.5E+02	**1.1E+02**	**1.5E+01**	**na**	**7.5E+02**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.1E+03	--	--	na	6.9E+01	--	--	na	1.1E+02	**--**	**--**	**na**	**1.1E+02**
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	7.8E+01	--	--	na	3.0E+00	--	--	na	7.8E+00	**--**	**--**	**na**	**7.8E+00**
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	1.6E+02	--	--	na	6.0E+00	--	--	na	1.6E+01	**--**	**--**	**na**	**1.6E+01**
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	1.3E+01	--	--	na	5.1E-01	--	--	na	1.3E+00	**--**	**--**	**na**	**1.3E+00**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	3.8E+01	9.4E+00	na	--	7.0E+00	1.7E+00	--	--	9.6E+00	2.3E+00	--	--	**9.6E+00**	**2.3E+00**	**na**	**--**
Parathion	0	6.5E-02	1.3E-02	na	--	8.9E-02	1.8E-02	na	--	1.6E-02	3.3E-03	na	--	2.2E-02	4.6E-03	na	--	**2.2E-02**	**4.6E-03**	**na**	**--**
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	2.0E-02	na	1.7E-03	--	3.5E-03	na	6.4E-05	--	5.0E-03	na	1.7E-04	**--**	**5.0E-03**	**na**	**1.7E-04**
Pentachlorophenol[c]	0	8.8E+00	6.8E+00	na	3.0E+01	1.2E+01	9.7E+00	na	7.8E+01	2.2E+00	1.7E+00	na	3.0E+00	3.0E+00	2.4E+00	na	7.8E+00	**3.0E+00**	**2.4E+00**	**na**	**7.8E+00**
Phenol	0	--	--	na	8.6E+05	--	--	na	1.4E+06	--	--	na	8.6E+04	--	--	na	1.4E+05	**--**	**--**	**na**	**1.4E+05**
Pyrene	0	--	--	na	4.0E+03	--	--	na	6.5E+03	--	--	na	4.0E+02	--	--	na	6.5E+02	**--**	**--**	**na**	**6.5E+02**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	6.5E+00	--	--	na	4.0E-01	--	--	na	6.5E-01	**--**	**--**	**na**	**6.5E-01**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**

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Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0.828	2.0E+01	5.0E+00	na	4.2E+03	2.7E+01	6.7E+00	na	6.8E+03	5.6E+00	1.9E+00	na	4.2E+02	7.4E+00	2.3E+00	na	6.8E+02	**7.4E+00**	**2.3E+00**	**na**	**6.8E+02**
Silver	1.103	9.7E+00	--	na	--	1.3E+01	--	na	--	3.3E+00	--	na	--	4.1E+00	--	na	--	**4.1E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	1.0E+02	--	--	na	4.0E+00	--	--	na	1.0E+01	**--**	**--**	**na**	**1.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	8.6E+01	--	--	na	3.3E+00	--	--	na	8.6E+00	**--**	**--**	**na**	**8.6E+00**
Thallium	0	--	--	na	4.7E-01	--	--	na	7.7E-01	--	--	na	4.7E-02	--	--	na	7.7E-02	**--**	**--**	**na**	**7.7E-02**
Toluene	0	--	--	na	6.0E+03	--	--	na	9.8E+03	--	--	na	6.0E+02	--	--	na	9.8E+02	**--**	**--**	**na**	**9.8E+02**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene[C]	0	7.3E-01	2.0E-04	na	2.8E-03	1.0E+00	2.8E-04	na	7.3E-03	1.8E-01	5.0E-05	na	2.8E-04	2.5E-01	7.1E-05	na	7.3E-04	**2.5E-01**	**7.1E-05**	**na**	**7.3E-04**
Tributyltin	0	4.6E-01	7.2E-02	na	--	6.3E-01	1.0E-01	na	--	1.2E-01	1.8E-02	na	--	1.6E-01	2.6E-02	na	--	**1.6E-01**	**2.6E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.1E+02	--	--	na	7.0E+00	--	--	na	1.1E+01	**--**	**--**	**na**	**1.1E+01**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	4.2E+02	--	--	na	1.6E+01	--	--	na	4.2E+01	**--**	**--**	**na**	**4.2E+01**
Trichloroethylene[C]	0	--	--	na	3.0E+02	--	--	na	7.8E+02	--	--	na	3.0E+01	--	--	na	7.8E+01	**--**	**--**	**na**	**7.8E+01**
2,4,6-Trichlorophenol[C]	0	--	--	na	2.4E+01	--	--	na	6.2E+01	--	--	na	2.4E+00	--	--	na	6.2E+00	**--**	**--**	**na**	**6.2E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	6.2E+01	--	--	na	2.4E+00	--	--	na	6.2E+00	**--**	**--**	**na**	**6.2E+00**
Zinc	19.31	2.0E+02	2.0E+02	na	2.6E+04	2.6E+02	2.7E+02	na	4.2E+04	6.3E+01	6.3E+01	na	2.6E+03	8.0E+01	8.2E+01	na	4.3E+03	**8.0E+01**	**8.2E+01**	**na**	**4.3E+03**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.0E+02
Arsenic	3.2E+01
Barium	na
Cadmium	4.9E-01
Chromium III	2.6E+01
Chromium VI	2.3E+00
Copper	3.9E+00
Iron	na
Lead	7.0E+00
Manganese	na
Mercury	2.0E-01
Nickel	9.0E+00
Selenium	1.4E+00
Silver	1.6E+00
Zinc	3.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

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62.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 62.000

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	85.000	107.000
7Q10	26.000	N/A	88.000	N/A
30Q10	33.000	70.000	95.000	132.000
30Q5	39.000	N/A	101.000	N/A
Harm. Mean	99.000	N/A	161.000	N/A
Annual Avg.	0.000	N/A	62.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.931	17.400
30Q10 90th% Temp. Mix (deg C)	23.138	17.400
1Q10 90th% pH Mix (SU)	7.327	7.418
30Q10 90th% pH Mix (SU)	7.371	7.498
1Q10 10th% pH Mix (SU)	7.006	N/A
7Q10 10th% pH Mix (SU)	7.017	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	182.7	182.7
7Q10 Hardness (mg/L as CaCO3)	181.8	181.8

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.327
(7.204 - pH)	-0.123
(pH - 7.204)	0.123
Trout Present Criterion (mg N/l	16.914
Trout Absent Criterion (mg N/L	25.328
Trout Present?	n
Effective Criterion (mg N/L)	25.328

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.138
90th Percentile pH (SU)	7.371
MIN	1.635
MAX	23.138
(7.688 - pH)	0.317
(pH - 7.688)	-0.317
Early LS Present Criterion (mg N	2.774
Early LS Absent Criterion (mg N/	2.774
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.774

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.418
(7.204 - pH)	-0.214
(pH - 7.204)	0.214
Trout Present Criterion (mg N/l	14.971
Trout Absent Criterion (mg N/L	22.417
Trout Present?	n
Effective Criterion (mg N/L)	22.417

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.498
MIN	2.367
MAX	17.400
(7.688 - pH)	0.190
(pH - 7.688)	-0.190
Early LS Present Criterion (mg N	3.630
Early LS Absent Criterion (mg N/	3.630
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.630

62.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 62.000

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	85.000	107.000
7Q10	26.000	N/A	88.000	N/A
30Q10	33.000	70.000	95.000	132.000
30Q5	39.000	N/A	101.000	N/A
Harm. Mean	99.000	N/A	161.000	N/A
Annual Avg.	0.000	N/A	62.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.931	17.400
30Q10 90th% Temp. Mix (deg C)	23.138	17.400
1Q10 90th% pH Mix (SU)	7.327	7.418
30Q10 90th% pH Mix (SU)	7.371	7.498
1Q10 10th% pH Mix (SU)	7.006	N/A
7Q10 10th% pH Mix (SU)	7.017	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	182.718	182.718
7Q10 Hardness (mg/L as CaCO3) =	181.773	181.773

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.327
(7.204 - pH)	-0.123
(pH - 7.204)	0.123
Trout Present Criterion (mg N/l	16.914
Trout Absent Criterion (mg N/L	25.328
Trout Present?	n
Effective Criterion (mg N/L)	25.328

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.138
90th Percentile pH (SU)	7.371
MIN	1.635
MAX	23.138
(7.688 - pH)	0.317
(pH - 7.688)	-0.317
Early LS Present Criterion (mg N	2.774
Early LS Absent Criterion (mg N/	2.774
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.774

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.418
(7.204 - pH)	-0.214
(pH - 7.204)	0.214
Trout Present Criterion (mg N/l	14.971
Trout Absent Criterion (mg N/L	22.417
Trout Present?	n
Effective Criterion (mg N/L)	22.417

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.498
MIN	2.367
MAX	17.400
(7.688 - pH)	0.190
(pH - 7.688)	-0.190
Early LS Present Criterion (mg N	3.630
Early LS Absent Criterion (mg N/	3.630
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.630

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FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: WVWA WPCP (62 MGD) (chronic metal AWLAs) Permit No.: VA0025020

Receiving Stream: Roanoke River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	155	mg/L
90% Temperature (Annual) =	24.9	deg C
90% Temperature (Wet season) =	17.4	deg C
90% Maximum pH =	8.4	SU
10% Maximum pH =	7.6	SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	23	MGD
7Q10 (Annual) =	26	MGD
30Q10 (Annual) =	33	MGD
1Q10 (Wet season) =	45	MGD
30Q10 (Wet season)	70	MGD
30Q5 =	39	MGD
Harmonic Mean =	99	MGD

Mixing Information

Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	193	mg/L
90% Temp (Annual) =	22.2	deg C
90% Temp (Wet season) =	17.4	deg C
90% Maximum pH =	7.2	SU
10% Maximum pH =	6.9	SU
Discharge Flow =	62	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.6E+03	--	--	na	9.9E+01	--	--	na	1.6E+02	**--**	**--**	**na**	**1.6E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.5E+01	--	--	na	9.3E-01	--	--	na	1.5E+00	**--**	**--**	**na**	**1.5E+00**
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	6.5E+00	--	--	na	2.5E-01	--	--	na	6.5E-01	**--**	**--**	**na**	**6.5E-01**
Aldrin[C]	0	3.0E+00	--	na	5.0E-04	4.1E+00	--	na	1.3E-03	7.5E-01	--	na	5.0E-05	1.0E+00	--	na	1.3E-04	**1.0E+00**	**--**	**na**	**1.3E-04**
Ammonia-N (mg/l) (Yearly)	0.044508	2.53E+01	2.77E+00	na	--	3.5E+01	4.2E+00	na	--	6.37E+00	7.27E-01	na	--	8.7E+00	1.1E+00	na	--	**8.7E+00**	**1.1E+00**	**na**	**--**
Ammonia-N (mg/l) (High Flow)	0.044508	2.24E+01	3.63E+00	na	--	3.9E+01	7.7E+00	na	--	5.64E+00	9.41E-01	na	--	9.7E+00	2.0E+00	na	--	**9.7E+00**	**2.0E+00**	**na**	**--**
Anthracene	0	--	--	na	4.0E+04	--	--	na	6.5E+04	--	--	na	4.0E+03	--	--	na	6.5E+03	**--**	**--**	**na**	**6.5E+03**
Antimony	0	--	--	na	6.4E+02	--	--	na	1.0E+03	--	--	na	6.4E+01	--	--	na	1.0E+02	**--**	**--**	**na**	**1.0E+02**
Arsenic	0.64	3.4E+02	1.5E+02	na	--	4.7E+02	2.1E+02	na	--	8.5E+01	3.8E+01	na	--	1.2E+02	5.4E+01	na	--	**1.2E+02**	**5.4E+01**	**na**	**--**
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Benzene[C]	0	--	--	na	5.1E+02	--	--	na	1.3E+03	--	--	na	5.1E+01	--	--	na	1.3E+02	**--**	**--**	**na**	**1.3E+02**
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	5.2E-03	--	--	na	2.0E-04	--	--	na	5.2E-04	**--**	**--**	**na**	**5.2E-04**
Benzo (a) anthracene[C]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	**--**	**--**	**na**	**4.7E-02**
Benzo (b) fluoranthene[C]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	**--**	**--**	**na**	**4.7E-02**
Benzo (k) fluoranthene[C]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	**--**	**--**	**na**	**4.7E-02**
Benzo (a) pyrene[C]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	**--**	**--**	**na**	**4.7E-02**
Bis2-Chloroethyl Ether[C]	0	--	--	na	5.3E+00	--	--	na	1.4E+01	--	--	na	5.3E-01	--	--	na	1.4E+00	**--**	**--**	**na**	**1.4E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.1E+05	--	--	na	6.5E+03	--	--	na	1.1E+04	**--**	**--**	**na**	**1.1E+04**
Bis 2-Ethylhexyl Phthalate[C]	0	--	--	na	2.2E+01	--	--	na	5.7E+01	--	--	na	2.2E+00	--	--	na	5.7E+00	**--**	**--**	**na**	**5.7E+00**
Bromoform[C]	0	--	--	na	1.4E+03	--	--	na	3.6E+03	--	--	na	1.4E+02	--	--	na	3.6E+02	**--**	**--**	**na**	**3.6E+02**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.1E+03	--	--	na	1.9E+02	--	--	na	3.1E+02	**--**	**--**	**na**	**3.1E+02**
Cadmium	0.25	7.7E+00	1.8E+00	na	--	1.1E+01	2.5E+00	na	--	2.1E+00	6.4E-01	na	--	2.8E+00	8.0E-01	na	--	**2.8E+00**	**8.0E-01**	**na**	**--**
Carbon Tetrachloride[C]	p0+B10	--	--	na	1.6E+01	--	--	na	4.2E+01	--	--	na	1.6E+00	--	--	na	4.2E+00	**--**	**--**	**na**	**4.2E+00**
Chlordane[C]	0	2.4E+00	4.3E-03	na	8.1E-03	3.3E+00	6.1E-03	na	2.1E-02	6.0E-01	1.1E-03	na	8.1E-04	8.2E-01	1.5E-03	na	2.1E-03	**8.2E-01**	**1.5E-03**	**na**	**2.1E-03**
Chloride	46251.86	8.6E+05	2.3E+05	na	--	1.2E+06	3.1E+05	na	--	2.5E+05	9.2E+04	na	--	3.3E+05	1.1E+05	na	--	**3.3E+05**	**1.1E+05**	**na**	**--**
TRC	0	1.9E+01	1.1E+01	na	--	2.6E+01	1.6E+01	na	--	4.8E+00	2.8E+00	na	--	6.5E+00	3.9E+00	na	--	**6.5E+00**	**3.9E+00**	**na**	**--**
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	2.6E+03	--	--	na	1.6E+02	--	--	na	2.6E+02	**--**	**--**	**na**	**2.6E+02**

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Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	3.4E+02	--	--	na	1.3E+01	--	--	na	3.4E+01	--	--	na	**3.4E+01**
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.8E+04	--	--	na	1.1E+03	--	--	na	1.8E+03	--	--	na	**1.8E+03**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	2.6E+03	--	--	na	1.6E+02	--	--	na	2.6E+02	--	--	na	**2.6E+02**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.4E+02	--	--	na	1.5E+01	--	--	na	2.4E+01	--	--	na	**2.4E+01**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.1E-01	5.8E-02	na	--	2.1E-02	1.0E-02	na	--	2.8E-02	1.5E-02	na	--	**2.8E-02**	**1.5E-02**	na	--
Chromium III	0	9.3E+02	1.2E+02	na	--	1.3E+03	1.7E+02	na	--	2.3E+02	3.0E+01	na	--	3.2E+02	4.3E+01	na	--	**3.2E+02**	**4.3E+01**	na	--
Chromium VI	0.276	1.6E+01	1.1E+01	na	--	2.2E+01	1.5E+01	na	--	4.2E+00	3.0E+00	na	--	5.7E+00	4.1E+00	na	--	**5.7E+00**	**4.1E+00**	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.6E+01	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	1.8E-03	--	--	na	4.7E-03	--	--	na	**4.7E-03**
Copper	2.49	2.4E+01	1.5E+01	na	--	3.2E+01	2.0E+01	na	--	7.8E+00	5.6E+00	na	--	9.8E+00	6.9E+00	na	--	**9.8E+00**	**6.9E+00**	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	3.0E+01	7.4E+00	na	2.6E+04	5.5E+00	1.3E+00	na	1.6E+03	7.5E+00	1.8E+00	na	2.6E+03	**7.5E+00**	**1.8E+00**	na	**2.6E+03**
DDD[C]	0	--	--	na	3.1E-03	--	--	na	8.1E-03	--	--	na	3.1E-04	--	--	na	8.1E-04	--	--	na	**8.1E-04**
DDE[C]	0	--	--	na	2.2E-03	--	--	na	5.7E-03	--	--	na	2.2E-04	--	--	na	5.7E-04	--	--	na	**5.7E-04**
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.5E+00	1.4E-03	na	5.7E-03	2.8E-01	2.5E-04	na	2.2E-04	3.8E-01	3.5E-04	na	5.7E-04	**3.8E-01**	**3.5E-04**	na	**5.7E-04**
Demeton	0	--	1.0E-01	na	--	--	1.4E-01	na	--	--	2.5E-02	na	--	--	3.5E-02	na	--	--	**3.5E-02**	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	2.3E-01	2.4E-01	na	--	4.3E-02	4.3E-02	na	--	5.8E-02	6.0E-02	na	--	**5.8E-02**	**6.0E-02**	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	**4.7E-02**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.1E+03	--	--	na	1.3E+02	--	--	na	2.1E+02	--	--	na	**2.1E+02**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.6E+03	--	--	na	9.6E+01	--	--	na	1.6E+02	--	--	na	**1.6E+02**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.1E+02	--	--	na	1.9E+01	--	--	na	3.1E+01	--	--	na	**3.1E+01**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	7.3E-01	--	--	na	2.8E-02	--	--	na	7.3E-02	--	--	na	**7.3E-02**
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	4.4E+02	--	--	na	1.7E+01	--	--	na	4.4E+01	--	--	na	**4.4E+01**
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	9.6E+02	--	--	na	3.7E+01	--	--	na	9.6E+01	--	--	na	**9.6E+01**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.2E+04	--	--	na	7.1E+02	--	--	na	1.2E+03	--	--	na	**1.2E+03**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.6E+04	--	--	na	1.0E+03	--	--	na	1.6E+03	--	--	na	**1.6E+03**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	4.7E+02	--	--	na	2.9E+01	--	--	na	4.7E+01	--	--	na	**4.7E+01**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	3.9E+02	--	--	na	1.5E+01	--	--	na	3.9E+01	--	--	na	**3.9E+01**
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	5.5E+02	--	--	na	2.1E+01	--	--	na	5.5E+01	--	--	na	**5.5E+01**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	3.3E-01	7.9E-02	na	1.4E-03	6.0E-02	1.4E-02	na	5.4E-05	8.2E-02	2.0E-02	na	1.4E-04	**8.2E-02**	**2.0E-02**	na	**1.4E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	7.2E+04	--	--	na	4.4E+03	--	--	na	7.2E+03	--	--	na	**7.2E+03**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.4E+03	--	--	na	8.5E+01	--	--	na	1.4E+02	--	--	na	**1.4E+02**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.8E+06	--	--	na	1.1E+05	--	--	na	1.8E+05	--	--	na	**1.8E+05**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	7.3E+03	--	--	na	4.5E+02	--	--	na	7.3E+02	--	--	na	**7.3E+02**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	8.6E+03	--	--	na	5.3E+02	--	--	na	8.6E+02	--	--	na	**8.6E+02**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	4.6E+02	--	--	na	2.8E+01	--	--	na	4.6E+01	--	--	na	**4.6E+01**
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	8.8E+01	--	--	na	3.4E+00	--	--	na	8.8E+00	--	--	na	**8.8E+00**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	8.3E-08	--	--	na	5.1E-09	--	--	na	8.3E-09	--	--	na	**8.3E-09**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	5.2E+00	--	--	na	2.0E-01	--	--	na	5.2E-01	--	--	na	**5.2E-01**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.0E-01	7.9E-02	na	1.4E+02	5.5E-02	1.4E-02	na	8.9E+00	7.5E-02	2.0E-02	na	1.4E+01	**7.5E-02**	**2.0E-02**	na	**1.4E+01**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.0E-01	7.9E-02	na	1.4E+02	5.5E-02	1.4E-02	na	8.9E+00	7.5E-02	2.0E-02	na	1.4E+01	**7.5E-02**	**2.0E-02**	na	**1.4E+01**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	3.0E-01	7.9E-02	--	--	5.5E-02	1.4E-02	--	--	7.5E-02	2.0E-02	--	--	**7.5E-02**	**2.0E-02**	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.4E+02	--	--	na	8.9E+00	--	--	na	1.4E+01	--	--	na	**1.4E+01**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.2E-01	5.1E-02	na	9.8E-02	2.2E-02	9.0E-03	na	6.0E-03	2.9E-02	1.3E-02	na	9.8E-03	**2.9E-02**	**1.3E-02**	na	**9.8E-03**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	4.9E-01	--	--	na	3.0E-02	--	--	na	4.9E-02	--	--	na	**4.9E-02**

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Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.4E+03	--	--	na	2.1E+02	--	--	na	3.4E+02	--	--	na	**3.4E+02**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.3E+02	--	--	na	1.4E+01	--	--	na	2.3E+01	--	--	na	**2.3E+01**
Fluorene	0	--	--	na	5.3E+03	--	--	na	8.6E+03	--	--	na	5.3E+02	--	--	na	8.6E+02	--	--	na	**8.6E+02**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.4E-02	na	--	--	2.5E-03	na	--	--	3.5E-03	na	--	--	**3.5E-03**	na	--
Heptachlor[c]	0	5.2E-01	3.8E-03	na	7.9E-04	7.1E-01	5.4E-03	na	2.1E-03	1.3E-01	9.5E-04	na	7.9E-05	1.8E-01	1.3E-03	na	2.1E-04	**1.8E-01**	**1.3E-03**	na	**2.1E-04**
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	7.1E-01	5.4E-03	na	1.0E-03	1.3E-01	9.5E-04	na	3.9E-05	1.8E-01	1.3E-03	na	1.0E-04	**1.8E-01**	**1.3E-03**	na	**1.0E-04**
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	7.5E-03	--	--	na	2.9E-04	--	--	na	7.5E-04	--	--	na	**7.5E-04**
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	4.7E+02	--	--	na	1.8E+01	--	--	na	4.7E+01	--	--	na	**4.7E+01**
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	1.3E-01	--	--	na	4.9E-03	--	--	na	1.3E-02	--	--	na	**1.3E-02**
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	4.4E-01	--	--	na	1.7E-02	--	--	na	4.4E-02	--	--	na	**4.4E-02**
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.3E+00	--	na	4.7E+00	2.4E-01	--	na	1.8E-01	3.3E-01	--	na	4.7E-01	**3.3E-01**	--	na	**4.7E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.8E+03	--	--	na	1.1E+02	--	--	na	1.8E+02	--	--	na	**1.8E+02**
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	8.6E+01	--	--	na	3.3E+00	--	--	na	8.6E+00	--	--	na	**8.6E+00**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.8E+00	na	--	--	5.0E-01	na	--	--	7.1E-01	na	--	--	**7.1E-01**	na	--
Indeno (1,2,3-cd) pyrene[c]	0	--	--	na	1.8E-01	--	--	na	4.7E-01	--	--	na	1.8E-02	--	--	na	4.7E-02	--	--	na	**4.7E-02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	2.5E+04	--	--	na	9.6E+02	--	--	na	2.5E+03	--	--	na	**2.5E+03**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Lead	2.09	2.6E+02	2.9E+01	na	--	3.5E+02	4.0E+01	na	--	6.6E+01	8.8E+00	na	--	8.9E+01	1.2E+01	na	--	**8.9E+01**	**1.2E+01**	na	--
Malathion	0	--	1.0E-01	na	--	--	1.4E-01	na	--	--	2.5E-02	na	--	--	3.5E-02	na	--	--	**3.5E-02**	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury		1.4E+00	7.7E-01	--	--	1.9E+00	1.1E+00	--	--	3.5E-01	1.9E-01	--	--	4.8E-01	2.7E-01	--	--	**4.8E-01**	**2.7E-01**	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.4E+03	--	--	na	1.5E+02	--	--	na	2.4E+02	--	--	na	**2.4E+02**
Methylene Chloride[c]	0	--	--	na	5.9E+03	--	--	na	1.5E+04	--	--	na	5.9E+02	--	--	na	1.5E+03	--	--	na	**1.5E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	4.3E-02	na	--	--	7.5E-03	na	--	--	1.1E-02	na	--	--	**1.1E-02**	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Nickel	4.6	3.0E+02	3.4E+01	na	4.6E+03	4.1E+02	4.6E+01	na	7.5E+03	7.9E+01	1.2E+01	na	4.6E+02	1.1E+02	1.5E+01	na	7.5E+02	**1.1E+02**	**1.5E+01**	na	**7.5E+02**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.1E+03	--	--	na	6.9E+01	--	--	na	1.1E+02	--	--	na	**1.1E+02**
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	7.8E+01	--	--	na	3.0E+00	--	--	na	7.8E+00	--	--	na	**7.8E+00**
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	1.6E+02	--	--	na	6.0E+00	--	--	na	1.6E+01	--	--	na	**1.6E+01**
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	1.3E+01	--	--	na	5.1E-01	--	--	na	1.3E+00	--	--	na	**1.3E+00**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	3.8E+01	9.4E+00	na	--	7.0E+00	1.7E+00	--	--	9.6E+00	2.3E+00	--	--	**9.6E+00**	**2.3E+00**	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	8.9E-02	1.8E-02	na	--	1.6E-02	3.3E-03	na	--	2.2E-02	4.6E-03	na	--	**2.2E-02**	**4.6E-03**	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	2.0E-02	na	1.7E-03	--	3.5E-03	na	6.4E-05	--	5.0E-03	na	1.7E-04	--	**5.0E-03**	na	**1.7E-04**
Pentachlorophenol[c]	0	8.8E+00	6.8E+00	na	3.0E+01	1.2E+01	9.7E+00	na	7.8E+01	2.2E+00	1.7E+00	na	3.0E+00	3.0E+00	2.4E+00	na	7.8E+00	**3.0E+00**	**2.4E+00**	na	**7.8E+00**
Phenol	0	--	--	na	8.6E+05	--	--	na	1.4E+06	--	--	na	8.6E+04	--	--	na	1.4E+05	--	--	na	**1.4E+05**
Pyrene	0	--	--	na	4.0E+03	--	--	na	6.5E+03	--	--	na	4.0E+02	--	--	na	6.5E+02	--	--	na	**6.5E+02**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	6.5E+00	--	--	na	4.0E-01	--	--	na	6.5E-01	--	--	na	**6.5E-01**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

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Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0.835	2.0E+01	5.0E+00	na	4.2E+03	2.7E+01	6.7E+00	na	6.8E+03	5.6E+00	1.9E+00	na	4.2E+02	7.4E+00	2.3E+00	na	6.8E+02	**7.4E+00**	**2.3E+00**	**na**	**6.8E+02**
Silver	1.057	9.7E+00	--	na	--	1.3E+01	--	na	--	3.2E+00	--	na	--	4.0E+00	--	na	--	**4.0E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[c]	0	--	--	na	4.0E+01	--	--	na	1.0E+02	--	--	na	4.0E+00	--	--	na	1.0E+01	**--**	**--**	**na**	**1.0E+01**
Tetrachloroethylene[c]	0	--	--	na	3.3E+01	--	--	na	8.6E+01	--	--	na	3.3E+00	--	--	na	8.6E+00	**--**	**--**	**na**	**8.6E+00**
Thallium	0	--	--	na	4.7E-01	--	--	na	7.7E-01	--	--	na	4.7E-02	--	--	na	7.7E-02	**--**	**--**	**na**	**7.7E-02**
Toluene	0	--	--	na	6.0E+03	--	--	na	9.8E+03	--	--	na	6.0E+02	--	--	na	9.8E+02	**--**	**--**	**na**	**9.8E+02**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene[c]	0	7.3E-01	2.0E-04	na	2.8E-03	1.0E+00	2.8E-04	na	7.3E-03	1.8E-01	5.0E-05	na	2.8E-04	2.5E-01	7.1E-05	na	7.3E-04	**2.5E-01**	**7.1E-05**	**na**	**7.3E-04**
Tributyltin	0	4.6E-01	7.2E-02	na	--	6.3E-01	1.0E-01	na	--	1.2E-01	1.8E-02	na	--	1.6E-01	2.6E-02	na	--	**1.6E-01**	**2.6E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.1E+02	--	--	na	7.0E+00	--	--	na	1.1E+01	**--**	**--**	**na**	**1.1E+01**
1,1,2-Trichloroethane[c]	0	--	--	na	1.6E+02	--	--	na	4.2E+02	--	--	na	1.6E+01	--	--	na	4.2E+01	**--**	**--**	**na**	**4.2E+01**
Trichloroethylene[c]	0	--	--	na	3.0E+02	--	--	na	7.8E+02	--	--	na	3.0E+01	--	--	na	7.8E+01	**--**	**--**	**na**	**7.8E+01**
2,4,6-Trichlorophenol[c]	0	--	--	na	2.4E+01	--	--	na	6.2E+01	--	--	na	2.4E+00	--	--	na	6.2E+00	**--**	**--**	**na**	**6.2E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[c]	0	--	--	na	2.4E+01	--	--	na	6.2E+01	--	--	na	2.4E+00	--	--	na	6.2E+00	**--**	**--**	**na**	**6.2E+00**
Zinc	18.45	2.0E+02	2.0E+02	na	2.6E+04	2.6E+02	2.7E+02	na	4.2E+04	6.3E+01	6.3E+01	na	2.6E+03	7.9E+01	8.1E+01	na	4.3E+03	**7.9E+01**	**8.1E+01**	**na**	**4.3E+03**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.0E+02
Arsenic	3.2E+01
Barium	na
Cadmium	4.8E-01
Chromium III	2.6E+01
Chromium VI	2.3E+00
Copper	3.9E+00
Iron	na
Lead	7.0E+00
Manganese	na
Mercury	1.6E-01
Nickel	8.9E+00
Selenium	1.4E+00
Silver	1.6E+00
Zinc	3.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

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62.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 62.000

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	85.000	107.000
7Q10	26.000	N/A	88.000	N/A
30Q10	33.000	70.000	95.000	132.000
30Q5	39.000	N/A	101.000	N/A
Harm. Mean	99.000	N/A	161.000	N/A
Annual Avg.	0.000	N/A	62.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.931	17.400
30Q10 90th% Temp. Mix (deg C)	23.138	17.400
1Q10 90th% pH Mix (SU)	7.327	7.418
30Q10 90th% pH Mix (SU)	7.371	7.498
1Q10 10th% pH Mix (SU)	7.006	N/A
7Q10 10th% pH Mix (SU)	7.017	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	182.7	182.7
7Q10 Hardness (mg/L as CaCO3)	181.8	181.8

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.327
(7.204 - pH)	-0.123
(pH - 7.204)	0.123
Trout Present Criterion (mg N/l	16.914
Trout Absent Criterion (mg N/L	25.328
Trout Present?	n
Effective Criterion (mg N/L)	25.328

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.138
90th Percentile pH (SU)	7.371
MIN	1.635
MAX	23.138
(7.688 - pH)	0.317
(pH - 7.688)	-0.317
Early LS Present Criterion (mg N	2.774
Early LS Absent Criterion (mg N/	2.774
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.774

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.418
(7.204 - pH)	-0.214
(pH - 7.204)	0.214
Trout Present Criterion (mg N/l	14.971
Trout Absent Criterion (mg N/L	22.417
Trout Present?	n
Effective Criterion (mg N/L)	22.417

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.498
MIN	2.367
MAX	17.400
(7.688 - pH)	0.190
(pH - 7.688)	-0.190
Early LS Present Criterion (mg N	3.630
Early LS Absent Criterion (mg N/	3.630
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.630

62.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 62.000

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	23.000	45.000	85.000	107.000
7Q10	26.000	N/A	88.000	N/A
30Q10	33.000	70.000	95.000	132.000
30Q5	39.000	N/A	101.000	N/A
Harm. Mean	99.000	N/A	161.000	N/A
Annual Avg.	0.000	N/A	62.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	22.931	17.400
30Q10 90th% Temp. Mix (deg C)	23.138	17.400
1Q10 90th% pH Mix (SU)	7.327	7.418
30Q10 90th% pH Mix (SU)	7.371	7.498
1Q10 10th% pH Mix (SU)	7.006	N/A
7Q10 10th% pH Mix (SU)	7.017	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	182.718	182.718
7Q10 Hardness (mg/L as CaCO3) =	181.773	181.773

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.327
(7.204 - pH)	-0.123
(pH - 7.204)	0.123
Trout Present Criterion (mg N/l	16.914
Trout Absent Criterion (mg N/L	25.328
Trout Present?	n
Effective Criterion (mg N/L)	25.328

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	23.138
90th Percentile pH (SU)	7.371
MIN	1.635
MAX	23.138
(7.688 - pH)	0.317
(pH - 7.688)	-0.317
Early LS Present Criterion (mg N	2.774
Early LS Absent Criterion (mg N/	2.774
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.774

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.418
(7.204 - pH)	-0.214
(pH - 7.204)	0.214
Trout Present Criterion (mg N/l	14.971
Trout Absent Criterion (mg N/L	22.417
Trout Present?	n
Effective Criterion (mg N/L)	22.417

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.400
90th Percentile pH (SU)	7.498
MIN	2.367
MAX	17.400
(7.688 - pH)	0.190
(pH - 7.688)	-0.190
Early LS Present Criterion (mg N	3.630
Early LS Absent Criterion (mg N/	3.630
Early Life Stages Present?	y
Effective Criterion (mg N/L)	3.630

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WVWA WPCP
Outfall 001
VA0025020

Summary of AWLAs
(Ammonia, Metals, Organics, TRC above QLs)
62 MGD Facility

Parameter	Acute AWLA (µg/L)	Chronic AWLA (µg/L)	Human Health (µg/L)
ammonia as N (yearly) (mg/L)	8.7	1.1	
ammonia as N (high flow) (mg/L)	9.7	2.0	
chloride	330,000	110,000	
chloroform			1800
chlorodibromomethane			34
copper, dissolved	9.8	6.9	
dichlorobromomethane			44
lead, dissolved	89	12	
nickel, dissolved	110	15	
total residual chlorine (mg/L)	0.0065	0.0039	
zinc, dissolved	80	82	

Western Virginia Water Authority WPCP
VA0025020
Outfall 001

Comparison of Existing TKN Limits and Ammonia Limits Needed (62 MGD Facility)

Month	Monthly Average			Weekly Average		
	TKN Limit Required by WQMP (TKN-3.0) (mg/L)	Ammonia Limit Needed from STATS (mg/L)	TKN Limit Needed	TKN Limit Required by WQMP (equivalent ammonia conc.) (mg/L)	Ammonia Limit Needed from STATS (mg/L)	TKN Limit Needed
April	**2.0 (-1.0)***	2.2	2.0	**3.0 (0.0)***	3.0	3.0
May	**2.0 (-1.0)***	2.2	2.0	**3.0 (0.0)***	3.0	3.0
June	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
July	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
Aug	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
Sep	**2.0 (-1.0)***	1.2	2.0	**3.0 (0.0)***	1.6	3.0
Oct	**4.0 (1.0)***	1.2	4.0	5.0 (2.0)*	**1.6**	4.6
Nov	**4.0 (1.0)***	1.2	4.0	5.0 (2.0)*	**1.6**	4.6
Dec	**4.0 (1.0)***	1.2	4.0	5.0 (2.0)*	**1.6**	4.6
Jan	**4.0 (1.0)***	2.2	4.0	**5.0 (2.0)***	3.0	5.0
Feb	**4.0 (1.0)***	2.2	4.0	**5.0 (2.0)***	3.0	5.0
Mar	**4.0 (1.0)***	2.2	4.0	**5.0 (2.0)***	3.0	5.0

Notes:
Most stringent concentration limit highlighted in yellow.
Assumed TKN = ammonia conc. + 3.0 mg/L
* (Equivalent ammonia concentration calculated from TKN limits and given in parenthesis.
Values of 0 and -1 mg/L are not reflective of an actual ammonia concentration.)
They are screening values as per Guidance Memorandum 00-2011.

TKN Tiers Needed Jan. - Mar., April - Sep., Oct. - Dec.
The equivalent ammonia concentration was compared with the ammonia limit needed from STATS program.
The more stringent of the two number was expressed as a TKN limit for the permit.

276 (WU)

12/3/2013 12:19:00 PM

Facility = WVWA WPCP (62 MGD)
Chemical = ammonia (mg/L) (Jan. - May) high flow
Chronic averaging period = 30
WLAa = 9.7
WLAc = 2
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.03534018683262
Average Weekly limit = 2.95162415669945
Average Monthly LImit = 2.19857420580709

The data are:

9

12/3/2013 12:19:41 PM

Facility = WVWA WPCP (62 MGD)
Chemical = ammonia (mg/L) (June - Dec.) low flow
Chronic averaging period = 30
WLAa = 8.7
WLAc = 1.1
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 2.21943710275794
Average Weekly limit = 1.6233932861847
Average Monthly LImit = 1.2092158131939

The data are:

9

9/4/2013 11:28:24 AM

Facility = WVWA WPCP (62 MGD)
Chemical = chloride (mg/L)
Chronic averaging period = 4
WLAa = 330000
WLAc = 110000
Q.L. = 5000
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 10
Expected Value = 81623.6
Variance = 2380630
C.V. = 0.189029
97th percentile daily values = 114092.
97th percentile 4 day average = 97033.8
97th percentile 30 day average= 86922.4
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

70000
70000
76000
93000
86000
90000
96000
95000
85000
53000

9/4/2013 11:29:39 AM

Facility = WVWA WPCP (62 MGD)
Chemical = copper, dissolved (ug/L)
Chronic averaging period = 4
WLAa = 9.8
WLAc = 6.9
Q.L. = 0.50
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 10
Expected Value = 4.35813
Variance = 2.74712
C.V. = 0.380311
97th percentile daily values = 8.13232
97th percentile 4 day average = 6.10308
97th percentile 30 day average= 4.92733
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

3.9
3.27
4.03
4.17
3.23
2.92
3.03
5.1
10.3
3.91

12/11/2013 10:45:11 AM

Facility = WVWA WPCP (62 MGD)
Chemical = lead, dissolved (ug/L)
Chronic averaging period = 4
WLAa = 89
WLAc = 12
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 2.1
Variance = 1.5876
C.V. = 0.6
97th percentile daily values = 5.11017
97th percentile 4 day average = 3.49395
97th percentile 30 day average= 2.53271
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

2.1

12/11/2013 10:44:48 AM

Facility = WVWA WPCP (62 MGD)
Chemical = lead, total (ug/L)
Chronic averaging period = 4
WLAa = 89
WLAc = 12
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = .22
Variance = .017424
C.V. = 0.6
97th percentile daily values = .535351
97th percentile 4 day average = .366033
97th percentile 30 day average= .265331
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

0.34
0.14
0.18

12/11/2013 10:55:16 AM

Facility = WVWA WPCP (62 MGD)
Chemical = nickel, total (ug/L)
Chronic averaging period = 4
WLAa = 110
WLAc = 15
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = 2.43
Variance = 2.12576
C.V. = 0.6
97th percentile daily values = 5.91320
97th percentile 4 day average = 4.04301
97th percentile 30 day average= 2.93070
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1.66
2.17
3.46

12/11/2013 10:49:54 AM

Facility = WVWA WPCP (62 MGD)
Chemical = TRC (mg/L)
Chronic averaging period = 4
WLAa = 0.0065
WLAc = 0.0039
Q.L. = 0.1
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 1000
Variance = 360000
C.V. = 0.6
97th percentile daily values = 2433.41
97th percentile 4 day average = 1663.79
97th percentile 30 day average= 1206.05
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 5.7040416578076E-03
Average Weekly limit = 3.40248985908037E-03
Average Monthly LImit = 2.82704376519233E-03

The data are:

1000

1/14/2014 9:41:22 AM

Facility = WVWA WPCP (62 MGD)
Chemical = TRC (mg/L)
Chronic averaging period = 4
WLAa = 0.0065
WLAc = 0.0039
Q.L. = 0.1
# samples/mo. = 360
# samples/wk. = 90

Summary of Statistics:

observations = 1
Expected Value = 1000
Variance = 360000
C.V. = 0.6
97th percentile daily values = 2433.41
97th percentile 4 day average = 1663.79
97th percentile 30 day average= 1206.05
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 5.7040416578076E-03 0.0026
Average Weekly limit = 2.63459243152129E-03
Average Monthly LImit = 2.48347516453846E-03 0.0025

The data are:

1000

285
(109)

Attachment P

Whole Effluent Toxicity (WET)

- **WET Testing Justification Memorandum**
- **Acute/ Chronic Toxicity Endpoint Spreadsheets (55 MGD, 62 MGD)**
- **STATS Program Results (55 MGD, 62 MGD)**

286
(110)

MEMORANDUM
DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Whole Effluent Toxicity (WET) Testing Justification for Western Virginia Water Authority WPCP; VPDES Permit No. VA0025020

TO: Permit File

FROM: Becky L. France, Water Permit Writer BLF

DATE: October 31, 2013 (Revised 1/9/14)

INTRODUCTION:

The Western Virginia Water Authority (WVWA) owns and operates the WVWA Water Pollution Control Plant, which serves the cities of Roanoke and Salem, the counties of Roanoke and Botetourt, and the Town of Vinton. Table 1 summarizes the facility information. The permit for this facility was reissued on February 21, 2009, and includes a Toxics Management Program (TMP) for outfall 001, which is also summarized in Table 1.

TOXICITY EVALUATION / DISCUSSION:

Tables 2 and 3 include a compilation of the acute and chronic toxicity testing data for outfall 001 since June of 2004. The facility has completed 14 valid acute toxicity tests with *Ceriodaphnia dubia* and 13 valid acute toxicity tests with *Pimephales promelas*. The facility has completed 16 valid chronic toxicity tests with *C. dubia* and 15 valid chronic toxicity tests with *P. promelas*. The results of the acute tests indicated that the effluent was not acutely toxic to *C. dubia* or *P. promelas*. In the chronic tests, the survival or growth of the *P. promelas* was not affected in any of the effluent test concentrations. The survival of the *C. dubia* was not affected in any of the chronic toxicity tests. But, in 2 of the 16 chronic toxicity tests, the reproduction of the *C. dubia* was adversely affected.

The wasteload allocations for the 55 MGD and 62 MGD facilities were calculated with the flow frequency data and the default coefficient of variation of 0.6. These wasteload allocations and the data for each species were entered into the STATS program to determine if there is a potential to exceed the wasteload allocations. The program indicated that whole effluent toxicity limits are not needed for the 55 MGD or the 62 MGD facilities.

For the next reissuance, four sets of whole effluent toxicity data using both species will be needed. Since the data in Table 2 shows no acute toxicity and the instream waste concentration is 68%, only chronic toxicity testing is needed for the 55 MGD facility. Therefore, 55 MGD facility permit requirements shall be drafted to include chronic toxicity testing with *C. dubia* and *P. promelas*. For the 62 MGD facility, four quarters of acute and chronic toxicity testing shall be required with both species. The toxicity testing NOEC endpoint calculations are included on the attached spreadsheet.

Table 1. **FACILITY INFORMATION**

FACILITY: Western Virginia Water Authority WPCP

LOCATION: 1502 Brownlee Avenue, S.E., Roanoke, Virginia

VPDES PERMIT NUMBER: VA0025020 **Current Expiration Date:** 02/18/09

SIC CODE/DESCRIPTION: 4952/Wastewater Treatment Plant

OUTFALL/FLOWS (MGD): **Outfall 001** = 55 MGD; 62 MGD (Proposed)

RECEIVING STREAM/CRITICAL FLOWS/IWC:

Receiving Stream:	Roanoke River	7Q10 = 26 MGD
River Basin:	Roanoke River	1Q10 = 23 MGD
Subbasin:	Roanoke River	30Q5 = 39 MGD
Section:	6	Harmonic mean = 99 MGD
Class:	IV	IWC = 68% (55 MGD Facility)
Special Standards:	6.5 – 9.5 S.U.	IWC = 70% (62 MGD Facility)

WASTEWATER TREATMENT:

The 55 MGD facility consists of screening, grit removal, primary sedimentation, secondary treatment by activated sludge, secondary clarification, phosphorous removal, nitrification aeration, nitrification clarification, polymer addition, rapid mixing, flocculation, coagulation, sedimentation, filtration, chlorination, dechlorination, and post-aeration; sludge is thickened, anaerobically digested, stored in on-site lagoons, and land applied by contract operator.

TMP REQUIREMENTS (2/2009-2/2014)

OUTFALL 001

55 MGD Facility: The permittee shall conduct annual acute and chronic toxicity testing using acute 48-hour static toxicity testing with *Pimephales promelas* and 3-brood survival and reproduction chronic toxicity testing with *Ceriodaphnia dubia* using 24-hour flow-proportioned composite samples.

62 MGD Facility: Commencing within 90 days from the issuance of the Certificate to Operate the upgraded facility, the permittee shall begin conducting quarterly acute and chronic toxicity testing using acute 48-hour static toxicity testing with *Ceriodaphnia dubia* and *Pimephales promelas* and 7-day larval survival and growth chronic toxicity testing with *Pimephales promelas* and 3-brood survival and reproduction chronic toxicity testing with *Ceriodaphnia dubia* using 24-hour flow-proportioned composite samples.

Table 2 Acute Test Results for WVWA WPCP; VA0025020, Outfall 001

Test Date (month/year)	Test Organism	LC_{50} (%)	% Survival in 100% effluent	Testing Laboratory
06/2004 Q1	*C. dubia*	> 100	100	Olver Labs
	P. promelas	>100	100	
10/2004 Q2	*C. dubia*	> 100	100	Olver Labs
	P. promelas	>100	100	
12/2004 Q3	*C. dubia*	> 100	100	Olver Labs
	P. promelas	>100	100	
02/2005 Q4	*C. dubia*	>100	100	Olver Labs
	P. promelas	>100	100	
11/2005 A1	*C. dubia*	>100	100	Olver Labs
6/2006 A2	*C. dubia*	> 100	95	Olver Labs
6/2007 A3	*C. dubia*	>100	100	Olver Labs
5/2008 Q1	*C. dubia*	>100	90	Olver Labs
	P. promelas	>100	100	
7/2008 Q2	*C. dubia*	>100	100	Olver Labs
	P. promelas	>100	100	
11/2008 Q3	*C. dubia*	>100	100	Olver Labs
	P. promelas	>100	100	
2/2009 Q4	*C. dubia*	>100	95	Olver Labs
	P. promelas	>100	100	
2/2010 A1	*P. promelas*	>100	100	BM
5/2010 A2	*P. promelas*	> 100	100	BM
6/2011 A3	*P. promelas*	> 100	100	BM
5/2012 A4	*P. promelas*	> 100	100	BM
4-5/2013 A5	*P. promelas*	> 100	100	BM
5-6/2013	*C. dubia*	> 100	100	BM
6-7/2013	*C. dubia*	> 100	100	BM
7-8/2013	*C. dubia*	> 100	100	BM

Notes:
Q = quarter A= annual BM = Biological Monitoring

Table 3 Chronic Toxicity Test Results for WVWA WPCP VA0025020, Outfall 001

Test Date (month/year)	Test Organism	NOEC % Survival	NOEC %Repro-Growth	TU_c	% Survival in 100% Effluent	Testing Laboratory
6/2004 Q1	*C. dubia*	100	100	1.0	100	Olver Labs
	P. promelas	100	100	1.0	100	
10/2004 Q2	*C. dubia*	100	100	1.0	100	Olver Labs
	P. promelas	100	100	1.0	100	
12/2004 Q3	*C. dubia*	100	100	1.0	100	Olver Labs
	P. promelas	100	100	1.0	100	Olver Labs
02/2005 Q4	*C. dubia*	100	100	1.0	100	Olver Labs
	P. promelas	100	100	1.0	97.5	Olver Labs
11/2005 A1	*P. promelas*	100	100	1.0	100	Olver Labs
6/2006 A2	*P. promelas*	100	100	1.0	92.5	Olver Labs
6/2007 A3	*P. promelas*	100	100	1.0	92.5	Olver Labs
5/2008 Q1	*C. dubia*	100	100	1.0	90	Olver Labs
	P. promelas	100	100	1.0	100	
7/2008 Q2	*C. dubia*	100	100	1.0	100	Olver Labs
	~~*P. promelas*~~	Invalid				
9/2008 Q2	*P. promelas*	100	100	1.0	100	Olver Labs
11/2008 Q3	*C. dubia*	100	100	1.0	100	Olver Labs
	P. promelas	100	100	1.0	100	
2/2009 Q4	*C. dubia*	100	100	1.0	100	Olver Labs
	P. promelas	100	100	1.0	82.5	
2/2010 A1	***C. dubia***	100	48	**2.08**	100	BM
3/2010 A1	***C. dubia***	100	49	**2.04**	100	BM
5/2010 A2	*C. dubia*	100	100	1.0	90	BM
6/2011 A3	*C. dubia*	100	100	1.0	90	BM
6/2012 A4	*C. dubia*	100	100	1.0	100	BM
5/2013 A5	*C. dubia*	100	100	1.0	100	BM
	P. promelas	100	100	1.0	100	BM
	P. promelas	100	100	1.0	100	BM
5-6/2013	*P. promelas*	100	100	1.0	100	BM
6-7/2013	*P. promelas*	100	100	1.0	100	BM
8/2013	*C. dubia*	100	100	1.0	100	BM
9/2013	*C. dubia*	100	100	1.0	100	BM

Notes:

Q = quarter A= annual BM = Biological Monitoring

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 12/13/13
File: WETLIM10.xls
(MIX.EXE required also)

Acute Endpoint/Permit Limit — **Use as LC_{50} in Special Condition, as TUa on DMR**

ACUTE	100% =	NOAEC	LC_{50} =	NA	% Use as	NA	TUa

ACUTE WLAa 0.42545455 — Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using STATS.EXE

Chronic Endpoint/Permit Limit — **Use as NOEC in Special Condition, as TUc on DMR**

CHRONIC	2.15397363	TU_c	NOEC =	47	% Use as	2.12	TU_c
BOTH*	4.25454556	TU_c	NOEC =	24	% Use as	4.16	TU_c
AML	2.15397363	TU_c	NOEC =	47	% Use as	2.12	TU_c

ACUTE WLAa,c 4.25454545
CHRONIC WLAc 1.47272727
* Both means acute expressed as chronic

Note: Inform the permittee that if the mean of the data exceeds this TUc: 1.0 a limit may result using STATS.EXE

Enter data in the cells with blue type:

Entry Date:	12/19/13	
Facility Name:	WWWA WPCP	
VPDES Number:	VA0025020	
Outfall Number:	1	
Plant Flow:	55	MGD
Acute 1Q10:	23	MGD
Chronic 7Q10:	26	MGD

% Flow to be used from MIX.EXE

100	%
100	%

Diffuser /modeling study?

Enter Y/N	n	
Acute	1	:1
Chronic	1	:1

Are data available to calculate CV? (Y/N)	N	(Minimum of 10 data points, same species, needed)	Go to Page 2
Are data available to calculate ACR? (Y/N)	N	(NOEC<LC50, do not use greater/less than data)	Go to Page 3

IWC_a	70.51282051	%	Plant flow/plant flow + 1Q10
IWC_c	67.90123457	%	Plant flow/plant flow + 7Q10

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

Dilution, acute	1.418181818	100/IWCa
Dilution, chronic	1.472727273	100/IWCc
WLA_a	0.425454545	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	1.472727273	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	4.254545455	ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447	Default = 0.41
eB	0.6010373	Default = 0.60
eC	2.4334175	Default = 2.43
eD	2.4334175	Default = 2.43 (1 samp) No. of sample 1

The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.

$LTA_{a,c}$	1.748382905	WLAa,c X's eA						
LTA_c	0.885164024	WLAc X's eB					Rounded NOEC's	%
MDL** with $LTA_{a,c}$	4.254545559	TU_c	NOEC =	23.504273	(Protects from acute/chronic toxicity)		NOEC = 24	%
MDL** with LTA_c	2.153973625	TU_c	NOEC =	46.425824	(Protects from chronic toxicity)		NOEC = 47	%
AML with lowest LTA	2.153973625	TU_c	NOEC =	46.425824	Lowest LTA X's eD		NOEC = 47	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

							Rounded LC50's	%
MDL with $LTA_{a,c}$	0.425454556	TU_a	LC50 =	235.042729	%	Use NOAEC=100%	LC50 = NA	%
MDL with LTA_c	0.215397363	TU_a	LC50 =	464.258238	%	Use NOAEC=100%	LC50 = NA	

290
062

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data		Invertebrate IC_{25} Data or LC_{50} Data	LN of data
	**********			**********	
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
11			11		
12			12		
13			13		
14			14		
15			15		
16			16		
17			17		
18			18		
19			19		
20			20		

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929666

eA = 0.410944686

Using the log variance to develop eB

(P. 100, step 2b of TSD)

δ_4^2 = 0.086177696

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA	NEED DATA
Mean	0	0	Mean	0	0
Variance	0	0.000000	Variance	0	0.000000
CV	0		CV	0	

Using the log variance to develop eC

(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD

(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 3. Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here: NO DATA $\%LC_{50}$ NO DATA TUa

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring % Effluent	Monitoring TUc	Limit % Effluent	Limit TUc
Dilution series based on data mean	100	1.0		
Dilution series to use for limit			47	2.1276596
Dilution factor to recommend:	0.5		0.6855655	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	50.0	2.00	68.6	1.46
	25.0	4.00	47.0	2.13
	12.5	8.00	32.2	3.10
	6.25	16.00	22.1	4.53
Extra dilutions if needed	3.12	32.05	15.1	6.60
	1.56	64.10	10.4	9.63

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L46
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

11/27/2013 11:40:29 AM

Facility = WVWA WPCP (55 MGD)
Chemical = Whole Effluent Toxicity T.U. C. dubia (chronic)
Chronic averaging period = 4
WLAa = 4.11290323
WLAc = 1.41935484
Q.L. = 1.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 16
Expected Value = 1.12840
Variance = .080007
C.V. = 0.250669
97th percentile daily values = 1.74137
97th percentile 4 day average = 1.41601
97th percentile 30 day average= 1.22554
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

1
1
1
1
1
1
1
1
2.08
2.04
1
1
1
1
1
1

11/27/2013 11:12:17 AM

Facility = WVWA WPCP (55 MGD)
Chemical = Whole Effluent Toxicity T.U. P. promelas (chronic)
Chronic averaging period = 4
WLAa = 4.25454545
WLAc = 1.47272727
Q.L. = 1.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 15
Expected Value = 1
Variance = 0
C.V. = 0
97th percentile daily values = 1
97th percentile 4 day average = 1
97th percentile 30 day average= 1
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 12/13/13
File: WETLIM10.xls
(MIX.EXE required also)

Acute Endpoint/Permit Limit			Use as LC_{50} in Special Condition, as TUa on DMR				
ACUTE	100% =	NOAEC	LC_{50} =	NA	% Use as	NA	TUa
ACUTE WLAa		0.41129032	Note: Inform the permittee that if the mean of the data exceeds				
			this TUa:	1.0	a limit may result using STATS.EXE		

Chronic Endpoint/Permit Limit			Use as NOEC in Special Condition, as TUc on DMR				
CHRONIC	2.07591245	TU_c	NOEC =	49	% Use as	2.04	TU_c
BOTH*	4.11290333	TU_c	NOEC =	25	% Use as	4.00	TU_c
AML	2.07591245	TU_c	NOEC =	49	% Use as	2.04	TU_c
ACUTE WLAa,c	4.11290323		Note: Inform the permittee that if the mean				
CHRONIC WLAc	1.41935484		of the data exceeds this TUc:			1.0	
* Both means acute expressed as chronic			a limit may result using STATS.EXE				

Enter data in the cells with blue type:

Entry Date:	12/19/13	
Facility Name:	WVWA WPCP	
VPDES Number:	VA0025020	
Outfall Number:	1	
Plant Flow:	62	MGD
Acute 1Q10:	23	MGD
Chronic 7Q10:	26	MGD

% Flow to be used from MIX.EXE

Acute	100	%
Chronic	100	%

Diffuser /modeling study?

Enter Y/N	n	
Acute	1	:1
Chronic	1	:1

Are data available to calculate CV? (Y/N)	N	(Minimum of 10 data points, same species, needed)	Go to Page 2
Are data available to calculate ACR? (Y/N)	N	(NOEC<LC50, do not use greater/less than data)	Go to Page 3

IWC_a	72.94117647	%	Plant flow/plant flow + 1Q10
IWC_c	70.45454545	%	Plant flow/plant flow + 7Q10

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

Dilution, acute	1.370967742
Dilution, chronic	1.419354839

100/IWCa
100/IWCc

WLA_a	0.411290323	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	1.419354839	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	4.112903226	ACR X's WLA_a - converts acute WLA to chronic units

ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447	Default = 0.41
eB	0.6010373	Default = 0.60
eC	2.4334175	Default = 2.43
eD	2.4334175	Default = 2.43 (1 samp)

No. of sample 1

****The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.**

$LTA_{a,c}$	1.690175782	WLAa,c X's eA							
LTA_c	0.8530852	WLAc X's eB					Rounded NOEC's		%
MDL** with $LTA_{a,c}$	4.112903327	TU_c	NOEC =	24.313725	(Protects from acute/chronic toxicity)		NOEC =	25	%
MDL** with LTA_c	2.075912455	TU_c	NOEC =	48.171588	(Protects from chronic toxicity)		NOEC =	49	%
AML with lowest LTA	2.075912455	TU_c	NOEC =	48.171588	Lowest LTA X's eD		NOEC =	49	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

							Rounded LC50's		%
MDL with $LTA_{a,c}$	0.411290333	TU_a	LC50 =	243.137249	%	Use NOAEC=100%	LC50 =	NA	%
MDL with LTA_c	0.207591245	TU_a	LC50 =	481.715882	%	Use NOAEC=100%	LC50 =	NA	

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Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929666

eA = 0.410944686

Using the log variance to develop eB

(P. 100, step 2b of TSD)

δ_4^2 = 0.086177696

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC

(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD

(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data	Invertebrate IC_{25} Data or LC_{50} Data	LN of data
	**********		**********	
1			1	
2			2	
3			3	
4			4	
5			5	
6			6	
7			7	
8			8	
9			9	
10			10	
11			11	
12			12	
13			13	
14			14	
15			15	
16			16	
17			17	
18			18	
19			19	
20			20	

St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA	NEED DATA
Mean	0	0	Mean	0	0
Variance	0	0.000000	Variance	0	0.000000
CV	0		CV	0	

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Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

Table 3. ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50,

enter it here:		NO DATA	$\%LC_{50}$
		NO DATA	TUa

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring % Effluent	Monitoring TUc	Limit % Effluent	Limit TUc
Dilution series based on data mean	100	1.0		
Dilution series to use for limit			49	2.0408163
Dilution factor to recommend:	0.5		0.7	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	50.0	2.00	70.0	1.43
	25.0	4.00	49.0	2.04
	12.5	8.00	34.3	2.92
	6.25	16.00	24.0	4.16
Extra dilutions if needed	3.12	32.05	16.8	5.95
	1.56	64.10	11.8	8.50

11/27/2013 11:22:21 AM

Facility = WVWA WPCP (62 MGD)
Chemical = Whole Effluent Toxicity T.U. C. dubia (chronic)
Chronic averaging period = 4
WLAa = 4.11290323
WLAc = 1.41935484
Q.L. = 1.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 16
Expected Value = 1.12840
Variance = .080007
C.V. = 0.250669
97th percentile daily values = 1.74137
97th percentile 4 day average = 1.41601
97th percentile 30 day average= 1.22554
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

1
1
1
1
1
1
1
1
2.08
2.04
1
1
1
1
1
1

11/27/2013 11:39:27 AM

Facility = WVWA WPCP (62 MGD)
Chemical = Whole Effluent Toxicity T.U. P. promelas (chronic)
Chronic averaging period = 4
WLAa = 4.11290323
WLAc = 1.41935484
Q.L. = 1.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 15
Expected Value = 1
Variance = 0
C.V. = 0
97th percentile daily values = 1
97th percentile 4 day average = 1
97th percentile 30 day average= 1
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

1
1
1
1
1
1
1
1
1
1
1
1
1
1
1
1

Attachment Q

Storm Water Data

- Storm Water Data (Outfalls 008, 009)
- Storm Water Lab Summary Data Sheets

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Western Virginia Water Authority WPCP
VA0025020

Storm Water Data: Form 2F, Part VII and DMR Data

Outfall 008

Sample Due Date (Sampling Date)	BOD_5 (mg/L)	TSS (mg/L)	TKN (mg/L)
Decision Criteria	**30**	**100**	**1.5**
2/7/2013 grab		<QL	<QL
3/10/13 grab	<QL	107	<QL
3/10/12 grab	17	**136**	**2.1**
3/10/11 grab	7	**228**	**1.8**

Outfall 009

DMR Due Date (Sampling Date)	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	Total Phosphorus (mg/L)	Oil and Grease (mg/L)	pH (S.U.)	TKN (mg/L)	TRC (mg/L)	*E. coli* (#/100 mL)	Nitrate + Nitrite (mg/L)
Decision Criteria	**30**	**120**	**100**	**2**		**6-9**	**1.5**			**0.68**
grab (9/20/13)					<5.0					
grab (8/9/13)					<2.0					
grab (5/6/13)	<5	27	3.4	0.14		7.4	1.1	<0.1	**980**	0.58
composite (5/6/13)	5	24	44.3	0.26			1.1			0.50
3/10/14 grab			2.6				<QL			
3/10/13 grab (2/11/13)	<QL		3.4				<QL			
3/10/12 grab (7/6/11)			67.5				**1.8**			
3/10/11 grab			**176**				1.0			

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(127)

WESTERN VIRGINIA WATER AUTHORITY

Roanoke Regional Water Pollution Control Plant Laboratory
1502 Brownlee Avenue, SE Roanoke, Virginia 24014
Virginia Lab ID: 450094 EPA Lab ID: VA01008

Roanoke Regional Water Pollution Control Plant
1502 Brownlee Avenue, SE
Roanoke, VA 24014

Analytical Report Date: 5/12/2013
Sample Order ID: 0506201306
Sample Received: 5/6/2013

Sample Description: Outfall 009
Collection Date Start: 5/6/2013 End: 5/6/2013
Collection Time Start: 13:21 End: 16:21

Sample Number: 0506201306-04
Sample Type: Composite
Matrix: Surface Water

Analysis	Result	Units	QL	Analysis Date	Analysis Time	Analyst	Method
BOD5	5	mg/L	5	05/07/13	09:06	LB/LW	SM 5210 B
Total Suspended Solids	44.3	mg/L	1	05/07/13	10:15	LW	SM 2540 D

Sample Description: Outfall 009
Collection Date Start: 5/6/2013 End: 5/6/2013
Collection Time Start: 13:21 End: 16:21

Sample Number: 0506201306-05
Sample Type: Composite
Matrix: Surface Water

Analysis	Result	Units	QL	Analysis Date	Analysis Time	Analyst	Method
Total Kjeldahl Nitrogen	1.1	mg/L	1	05/07/13	08:11	LB	SM 4500-NH3 D
Total Phosphorus	0.26	mg/L	0.05	05/07/13	13:50	LW	SM 4500-P E

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations."

Lisa Workman 05/12/13
Laboratory Supervisor / Analyst

"I certify that the aforementioned data has been evaluated using reasonable and accepted Quality Assurance and Control procedures and methods including, where necessary, discussion with the Supervisor directly responsible for the data and / or the individuals actually completing the necessary procedures to produce the data. By signature, this data meets the established criteria for Quality Assurance and Control review."

Janet Wilson 05-13-13
Quality Assurance Control Coordinator

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WESTERN VIRGINIA WATER AUTHORITY

Roanoke Regional Water Pollution Control Plant Laboratory
1502 Brownlee Avenue, SE Roanoke, Virginia 24014
Virginia Lab ID: 450094 EPA Lab ID: VA01008

Roanoke Regional Water Pollution Control Plant
1502 Brownlee Avenue, SE
Roanoke, VA 24014

Analytical Report Date: 5/12/2013
Sample Order ID: 0506201306
Sample Received: 5/6/2013

Sample Description: Outfall 009
Collection Date Start: 5/6/2013 End:
Collection Time Start: 13:21 End:

Sample Number: 0506201306-01
Sample Type: Grab
Matrix: Surface Water

Analysis	Result	Units	QL	Analysis Date	Analysis Time	Analyst	Method
BOD5 Comp.	ND	mg/L	5	05/07/13	09:06	LB/LW	SM 5210 B
pH Grab	7.4	SU		05/06/13	13:32	LW	SM 4500-H+B
Total Residual Chlorine Grab	ND	mg/L	0.1	05/06/13	13:33	LW	SM 4500-Cl G
Total Suspended Solids Comp.	3.4	mg/L	1	05/07/13	10:15	LW	SM 2540 D

Sample Description: Outfall 009
Collection Date Start: 5/6/2013 End:
Collection Time Start: 13:50 End:

Sample Number: 0506201306-02
Sample Type: Grab
Matrix: Surface Water

Analysis	Result	Units	QL	Analysis Date	Analysis Time	Analyst	Method
Total Kjeldahl Nitrogen Comp	1.1	mg/L	1	05/07/13	08:11	LB	SM 4500-NH3 D
Total Phosphorus Comp	0.14	mg/L	0.05	05/07/13	13:50	LW	SM 4500-P E

Sample Description: Outfall 009
Collection Date Start: 5/6/2013 End:
Collection Time Start: 13:50 End:

Sample Number: 0506201306-03
Sample Type: Grab
Matrix: Surface Water

Analysis	Result	Units	QL	Analysis Date	Analysis Time	Analyst	Method
Escherichia coli Grab	980	N/100mL	1	05/06/13	14:04	LB	Colilert

REI Consultants, Inc. - Analytical Report

WO#: 1305792

Date Reported: 5/9/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	5/6/2013 4:21:00 PM
Project:	STORM WATER	**Date Received:**	5/8/2013
Lab ID:	1305792-01A	**Matrix:**	Surface Water
Client Sample ID:	SW009 COMPOSITE	**Site ID:**	OUTFALL 009

Analysis	Result	PQL	MCL	Qual	Units	PrepDate	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	LW		NA				
Chemical Oxygen Demand		**Method: EPA410.4**					**Analyst: BA**
Chemical Oxygen Demand	24	10	NA		mg/L		5/8/2013 8:30 AM

REI Consultants, Inc. - Analytical Report

WO#: 1305792

Date Reported: 5/9/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	5/6/2013 1:50:00 PM
Project:	STORM WATER	**Date Received:**	5/8/2013
Lab ID:	1305792-02A	**Matrix:**	Surface Water
Client Sample ID:	SW009 GRAB	**Site ID:**	OUTFALL 009

Analysis	Result	PQL	MCL	Qual	Units	PrepDate	Date Analyzed
Field Parameters		**Method: FLD**					**Analyst:**
FieldSampler	LW		NA				
Chemical Oxygen Demand		**Method: EPA410.4**					**Analyst: BA**
Chemical Oxygen Demand	27	10	NA		mg/L		5/8/2013 8:30 AM

WESTERN VIRGINIA
WATER AUTHORITY

Drinking Water Quality Laboratory
EPA ID # 01069; Virginia ID # 00279
6200 West Main Street
Salem, VA 24153

Client:	Pretreatment Coordinator	Collection Date:	5/6/2013
Client Sample ID:	SW009	Collection Time:	13:50
	Grab SW 05/22/13	Matrix:	SW

Method: NO3 - EPA 353.2 Nitrate **Analyst:** SW

Lab ID:	Analysis	Units	Result	MDL	PQL	Qual.	Date/Time
131238	Nitrate-Nitrite	mg/L	0.58	0.02	0.02		5-17-13/15:15

Key: MCL Maximum Contaminant Level
MDL Minimum Detection Limit
NA Not Applicable
ND Not Detected at the PQL or MDL
PQL Practical Quantitation Limit

B Analyte found in reagent blank. Indicates possible reagent or background contamination
E Reported value exceeded calibration range
J Reported value is less than PQL but greater than MDL
H Holding time exceeded
PND Precision not determined
RND Recovery not determined
X Value exceeds MCL or Regulatory level

All tests were performed according to Standard Methods for the Examination of Water and Wastewater 20th Edition and EPA Methods for the Chemical Analysis of Water and Wastewater.

Quality Assurance Officer: Cheryl L. Brewer

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WESTERN VIRGINIA
WATER AUTHORITY

Drinking Water Quality Laboratory
EPA ID # 01069; Virginia ID # 00279
6200 West Main Street
Salem, VA 24153

Client:	Pretreatment Coordinator	Collection Date:	5/6/2013
Client Sample ID:	SW009	Collection Time:	13:21-16:21
	Composite due 05/22/13	Matrix:	SW

Method: NO3 - EPA 353.2 Nitrate

Analyst: SW

Lab ID:	Analysis	Units	Result	MDL	PQL	Qual.	Date/Time
131239	Nitrate-Nitrite	mg/L	0.50	0.02	0.02		5-17-13/15:16

Key: MCL Maximum Contaminant Level
MDL Minimum Detection Limit
NA Not Applicable
ND Not Detected at the PQL or MDL
PQL Practical Quantitation Limit

B Analyte found in reagent blank, indicates possible reagent or background contamination
E Reported value exceeded calibration range
J Reported value is less than PQL but greater than MDL
H Holding time exceeded
PND Precision not determined
RND Recovery not determined
X Value exceeds MCL or Regulatory level

All tests were performed according to Standard Methods for the Examination of Water and Wastewater 20th Edition and EPA Methods for the Chemical Analysis of Water and Wastewater.

Quality Assurance Officer: Cheryl L. Brown

REI Consultants, Inc. - Analytical Report

WO#: 1308B71

Date Reported: 8/14/2013

Client:	WESTERN VA WATER WWTP	**Collection Date:**	8/9/2013 3:05:00 PM
Project:	SW009	**Date Received:**	8/12/2013
Lab ID:	1308B71-01A	**Matrix:**	Surface Water
Client Sample ID:	SW009	**Site ID:**	

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed
OIL and GREASE		**Method: EPA1664A**					**Analyst: JJ**
Oil & Grease	ND	2.0	5.0	200		mg/L	8/13/2013 8:45 AM

REI Consultants, Inc. - Case Narrative

WO#: 1305792

Date Reported: 5/9/2013

Client: WESTERN VA WATER WWTP

Project: STORM WATER

The analytical results presented in this report were produced using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. Verification of required sample preservation (as required) is recorded on associated laboratory logs. Any deviation from compliance or method modification is identified within the body of this report by a qualifier footnote which is defined at the bottom of this page.

All sample results for solid samples are reported on an "as-received" wet weight basis unless otherwise noted.

Results reported for sums of individual parameters, such as TTHM and HAA5, may vary slightly from the sum of the individual parameter results, due to rounding of individual results, as required by EPA.

The test results in this report meet all NELAP (and/or VELAP) requirements for parameters except as noted in this report.

This report may not be reproduced, except in full, without the written approval of REIC.

DEFINITIONS:
MCL: Maximum Contaminant Level
MDL: Method Detection Limit; The lowest concentration of analyte that can be detected by the method in the applicable matrix.
Mg/Kg or mg/L: Units of part per million (PPM) - milligram per Kilogram (weight/weight) or milligram per Liter (weight/volume).
NA: Not Applicable
ND: Not Detected at the PQL or MDL
PQL: Practical Quantitation Limit; The lowest verified limit to which data is quantified without qualifications. Analyte concentrations below PQL are reported either as ND or as a number with a "J" qualifier.
Qual: Qualifier that applies to the analyte reported.
TIC: Tentatively Identified Compound, Estimated Concentration
Ug/Kg or ug/L: Units of part per billion (PPB) - microgram per kilogram (weight/weight) or microgram per liter (weight/volume).

QUALIFIERS:
*: Reported value exceeds required MCL
B: Analyte detected in the associated Method Blank at a concentration > 1/2 the PQL
E: Analyte concentration reported that exceeds the upper calibration standard. Greater uncertainty is associated with this result and data should be consider estimated.
H: Holding time for preparation or analysis has been exceeded.
J: Analyte concentration is reported, and is less than the PQL and greater than or equal to the MDL. The result reported is an estimate.
S: % REC (% recovery) exceeds control limits

CERTIFICATIONS:
Beaver, WV: WVDHHR 00412CM, WVDEP 060, VADCLS 00281, KYDEP 90039, TNDEQ TN02926, NCDWQ 466, PADEP 68-00839, VADCLS (VELAP) 460148
Bioassay (Beaver, WV): WVDEP 060, VADCLS(VELAP) 460149, PADEP 68-00839
Roanoke, VA: VADCLS(VELAP) 460150
Verona, VA: VADCLS(VELAP) 460151
Ashland, KY: KYDEP 00094

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Attachment R

Sewage Sludge

- **Sludge Data**
- **Sludge Received from Offsite**

WVWA WPCP
VA0025020

Sludge Received from Off Site

Generator	Dry Metric Tons Generated per Year
ABB, Inc.	2.1
Booker T. Washington WPCP	1.5
Blacksburg Country Club WWTP	5.7
Catawba Hospital	1.5
Falling Creek WPCP	7.4
Foster Falls Recreation Area	1.0
Ramsey's Mobile Home Park STP	<1.0
Roanoke Cement	2.0
Town of Buchanan	15
Town of Fincastle STP	<1.0
Whites Truck Stop	1.5
Woodhaven Nursing Home	3.65
Total Sludge Generated Off Site	41 +

Annual Sludge Generation Rate (Roanoke WPCF) (dry metric tons)	10,406

Total Sludge Received and Generated (dry metric tons)	10,447

Western Virgi[illegible]ter Authority
Water Polli[illegible]ntrol Plant
Attachment [illegible] Sludge Data

Sample Date	Pollutant Concentrations (mg/kg)													
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Potassium	Potash	Selinium	Zinc	TKN	% Solids
Jan-09	9.8	1.9		654	97	3.6	24	36	1,800	33,700	10.5	989	41,600	7.85
Feb-09	9.5	3.0		622	109	2.6	23	33	1,900	25,900	0	986	38,000	9.52
Mar-09	9.8	2.0		591	110	1.8	22	30	2,000	19,700	3.3	909	35,100	8.9
Apr-09	10.5	4.6		644	111	1.9	25	28	1,400	34,800	3.1	989	40,800	7.9
May-09	10.6	2.7		597	111	2	22	33	2,200	27,700	3.4	847	29,200	12.55
Jun-09	9.6	1.2		621	107	1.9	24	34	3,200	16,700	1.9	981	38,000	3.68
Jul-09	7.4	2.6		540	101	1.9	20	40	1,500	28,000	4.3	820	33,500	8.57
Jul-09	8.2	1.7		568	9.4	1.4	18	26	2,000	28,700	7.9	1640	40,600	7.78
Aug-09	8.7	2.1		599	107	2.1	18	32	2,400	30,400	11.4	3210	31,900	11.24
Sep-09	7.8	1.1		449	75	2	12	37	<0.04	34,000	8.3	721	32,800	6.59
Oct-09	10.1	2.6		608	104	1.3	16	28	2,300	22,800	0	920	42,300	6.39
Nov-09	10.9	3.0		636	114	2	20	30	2,000	27,200	0	1870	35,900	7.24
Dec-09	9.3	3.0		610	124	1.5	14	28	2,200	29,100	0	994	40,600	7.89
Jan-10	8.0	2.0		630	106	2.9	16	24	1,900	28,600	1	960	37,200	8.9
Feb-10	7.0	2.0		570	99	1.8	14	28	2,100	10,100	0	950	39,000	9.94
Mar-10	11.0	3.0		600	110	1.8	14	26	1,600	31,000	0	960	42,600	11.03
May-10	7.0	4.0		520	103	2.3	15	32	1,500	27,500	0	830	36,200	8.7
Jun-10	7.0	7.0		670	201	2.5	14	40	1,500	29,800	3	1090	37,400	7.43
Jul-10	8.0	5.0		666	177	2.2	13	37	1,500	29,700	0	1210	32,500	11.89
Aug-10	6.0	4.0		502	148	1.6	11	35	1,800	19,300	0	797	17,400	23.65
Sep-10	8.0	5.0		627	158	2	14	33	2,000	22,300	0	1060	33,000	12.89
Oct-10	4.0	1.0		235	49	0.4	9	13	8,000	11,400	0	349	15,800	16.6
Nov-10	9.0	3.0		611	118	2	21	28	1,800	29,600	0	940	38,100	9.83
Dec-10	11.0	3.0		652	125	1.9	23	35	2,200	25,400	3	988	39,300	10.04
Jan-11	9.0	3.0		634	116	2.2	18	28	2,100	8,000	<1.0	955	38,200	7.69
Mar-11	8.0	2.0		592	103	1.4	15	25	2,500	26,000	2	857	45,600	6.58
Apr-11	8.0	2.0		659	101	1.7	13	27	2,800	13,000	1	1,010	49,800.00	7.65
May-11	10.0	4.0		672	151	5.7	13	42	1,360	26,500	1.0	874	30900	10.55
Jun-11	2.8	0.9		588.0	112.0	0.5	5.3	6.8	1,650	37,700	0.4	811.0	24517	9.2
Jul-11	8.0	2.0		625	100	1	16	25	1,700	30,100	1	950	42700	7.5
Aug-11	8.5	2.7		693	103	1.3	16.5	25.15	1,630	25,100	1	783.5	37450	7.93
Sep-11	7.0	2.8		736	196	2.53	14.35	31.9	1,570	29,600	<1.0	938	25600	8.29
Oct-11	6.1	2.7		846	172	17	12.05	49.7	1,375	23,950	<1.0	843	16800	13.43
Nov-11	7.7	2.7	112	708	107	1.14	12.4	21	1,330	32,200	1	1000	24600	14.73
Dec-11	9.3	3.4		731	108	1.01	13.1	23.05	1,710	29,500	4	980.5	23400	13.96
Jan-12	10.0	2.0		652	102	1.20	15	24	1,780	25,500	1	962	31,300	11.02
Feb-12	8.0	3.0		433	156	1.40	8	31	1,300	21,400	ND	594	20,800	16.14
Mar-12	13.0	2.0	112	483	70	0.40	11	27	2,040	21,300	1	779	41,400	8.08
Apr-12	11.0	2.0		544	72	1.00	13	27	2,080	15,300	2	888	39,800	8.56
May-12	14.0	2.0		579	84	1.70	15	28	2,100	24,200	1	913	40,700	7.96
Jun-12	8.0	4.0		625	129	2.70	13	29	2,100	24,200	1	1,050	38,400	8.30
Jul-12	10.0	5.0		701	170	2.80	19	35	1,860	29,500	<1.0	1,090	34,200	8.24
Aug-12	9.0	4.0		592	91	1.60	15	29	2,850	28,600	1	908	44,200	6.86
Sep-12	10.0	3.0		684	114	2.10	19	31	2,020	38,800	1	1,060	40,800	9.37
Oct-12	9.0	3.0		624	101	2.00	19	26	2,250	34,600	<5.0	1,010	39,800	8.95
Nov-12	10.0	4.0	157	715	133	2.30	21	32	1,750	36,900	<5.0	1,020	40,400	8.44
Dec-12	11.0	3.0	141	587	120	1.30	20	31	1,830	30,900	868	868	35,500	9.57
Jan-13	12.0	3.0		597	103	1.3	26	31	1,350	26,200	<5.0	889	30,400	9.91
Feb-13	11.0	3.0	110	568	98	1.5	21	28	1,640	30,800	<5.0	827	30,900	10.02
Mar-13	9.0	3.0	107	565	96	1.5	20	30	1,890	30,700	5	809	30,700	9.36
Apr-13	5.0	2.0	123	455	58	0.8	9	24	2,360	18,700	<5.0	723	56,900	4.43
May-13	6.0	2.0	133	571	69	<0.4	12	30	1,860	28,300	<5.0	871	49,300	6.12
Jul-13	8.0	2.0	NA	569	78	1.1	13	25	1,600	29,800	<5.0	855	41,400	6.54
Average	8.80	2.84	124	605	111	2.11	16	30	2,022	26,429	23.21	984	35,764	9.67

Notes: 1. Detection levels vary based on solids concentrations.
2. Blank indicates not analyzed
3. Detection limit indicated as "less than" (<) values for those parameters not detected during analysis.

3A4
(135)

Attachment S

Virginia State Water Control Board Letter About Technology Limits

COMMONWEALTH OF VIRGINIA
STATE WATER CONTROL BOARD
EXECUTIVE SECRETARY
A. H. PAESSLER
P. O. BOX 11143 - RICHMOND, VIRGINIA 23230 - (703) 770-2241

315

BOARD MEMBERS
W. P. GRIFFIN
HENRY S. HOLLAND, III
W. H. SINGLETON
ROBERT W. SPESSARD
E. BLACKBURN MOORE
CHAIRMAN

September 11, 1970

Mr. Julian Hirst
City Manager
City of Roanoke
Municipal Building
Roanoke, Virginia 24011

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Dear Mr. Hirst:

The Water Control Board at its April 7-8, 1970, meeting adopted revised quality standards for all waters in the Commonwealth of Virginia. As part of the implementation program for achieving these water quality objectives, the Board will require that all waste discharge owners submit a detailed schedule for the completion of the necessary waste treatment systems to comply with the stream standards. The deadline for completion of adequate facilities is July 1, 1972.

The Board directed that a compliance program and schedule be submitted by each owner and should contain intermediate dates for completion of a preliminary report, completion of system design, advertisement for bids, and beginning of construction. Your compliance program and schedule is due October 15, 1970.

The revised quality standards classified Niagara Reservoir for recreation and propagation of fish and aquatic life. To protect these new uses, very high treatment must be provided by the sewage treatment plants operated by the Town of Vinton and City of Roanoke. Further, critical water quality conditions exist in the upper Roanoke River arm of Smith Mountain Lake and all means available, with present technology, must be utilized to protect this major recreational facility. Studies by our staff show that the major adverse influence in this portion of the lake is the over abundance of aquatic plant growth, principally algae. Nutrients, principally carbon dioxide, nitrogen and phosphorus are essential for the growth of these plants. Whereas, carbon dioxide and nitrogen are present in abundant amounts in the lake, limited phosphorus is available and consequently, the growth and proliferation of algae is proportional to the available phosphorus. Further, our studies show that the major source of phosphorus for the upper Roanoke River arm of the lake is the sewage treatment plant discharges in Roanoke and Vinton.

To protect these quality requirements, we believe the City's new treatment facilities must remove the maximum amount of phosphorus possible with present technology and accomplish a high degree of BOD and suspended solids removal. The BOD and suspended solids in the effluent should not exceed 5 to 10 mg/l. The foregoing is largely a confirmation of your recent discussion with Messrs. Robbins and Owens of our staff.

CLEAN STREAMS PROVIDE HEALTH WEALTH AND RECREATION

All inquiries concerning this matter should be directed to Mr. Millard H. Robbins, Jr., Director of the Pollution Abatement Division of this Agency.

Very truly yours,

A H Paessler

Executive Secretary

MHRJr:scc

cc: State Department of Health - Div. of Engineering (2)
Southwestern Regional Office - SWCB

SEP 1970
RECEIVED
CITY MANAGER'S OFFICE

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(141)

Attachment T

Sludge Lagoon Structural Integrity and Watertight Integrity Evaluation

- Lagoon Study Review Memorandum
- Lagoon Study Protocol
- Lagoon Study Approval Letter

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MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Sludge Lagoon Structural Integrity and Watertight Integrity Evaluation
Western Virginia Water Authority WPCP
Reissuance of VPDES Permit No. VA0025020

TO: Permit File

FROM: Becky L. France, Water Permit Writer BLF

DATE: December 11, 2013

In accordance with the Pat I.D.14 and Part I.D.15 of the current permit, the permittee completed a study in 2009 to evaluate the berm integrity of the four sludge lagoons. A trapping program for burrowing animals was initiated in 2009 and the 2012 study results indicated that this program appears to be effective.

Additionally, electromagnetic resistivity studies were conducted of each lagoon to determine if there was any leakage of pollutants. The geophysical results from 2009 to 2011 revealed no evidence of seepage through the berms. This report recommended a reduction in further geophysical investigations to no more than once during the permit term.

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(143)

ENTERED

Roanoke Regional WPCP
Lagoon Structural Integrity
And Watertight Integrity Study and Groundwater Risk Assessment
Combined Study Protocol and Schedule

I. Solicitation of professional services to be completed by July 17, 2009

II. Selection of primary consultant to be completed by August 14,2009

III. Preliminary site review and review of construction documents prior to initiation of field activities to be completed by August 31, 2009. Should the consultant desire to modify or add later activities to the proposed protocol, the consultant shall submit a technical memorandum proposing the modifications for approval to DEQ-BRRO by September 9, 2009.

IV. The initial field activity will involve a detailed visual inspection of the entire berm surrounding each lagoon, and of the area adjacent to the berm, will be performed by a qualified hydrogeologist or engineer. It is anticipated that this inspection will require two circuits around each lagoon; one on the top of each berm and one just beyond the extent of the berm structure (outside toe of the lagoon). This inspection will be performed to specifically look for significant soil cracking, subsidence and seepage. Any seeps detected will be sampled, and tested using screening level field techniques (i.e. portable "HACH"-type field measurement devices) for chloride and nitrogen species (ammonia, TKN, nitrate). The inspection report for this activity shall completed by October 30, 2009. In the event that the visual inspection indicates the need for additional investigation, the consultant shall include a recommendation in the inspection report.

V. The Consultant will conduct electromagnetic conductivity survey of the soil masses around the perimeter of each lagoon. The electromagnetic conductivity survey shall be performed to evaluate subsurface soil/hydrogeologic conditions. The appropriate schedule for completion of this activity shall be included in the September 9, 2009 memorandum. The electromagnetic conductivity study has been selected based upon initial discussions with experts in the field and evaluation of technologies approved for such studies by the EPA for such work. Upon further field evaluation, the consultant may determine that alternate

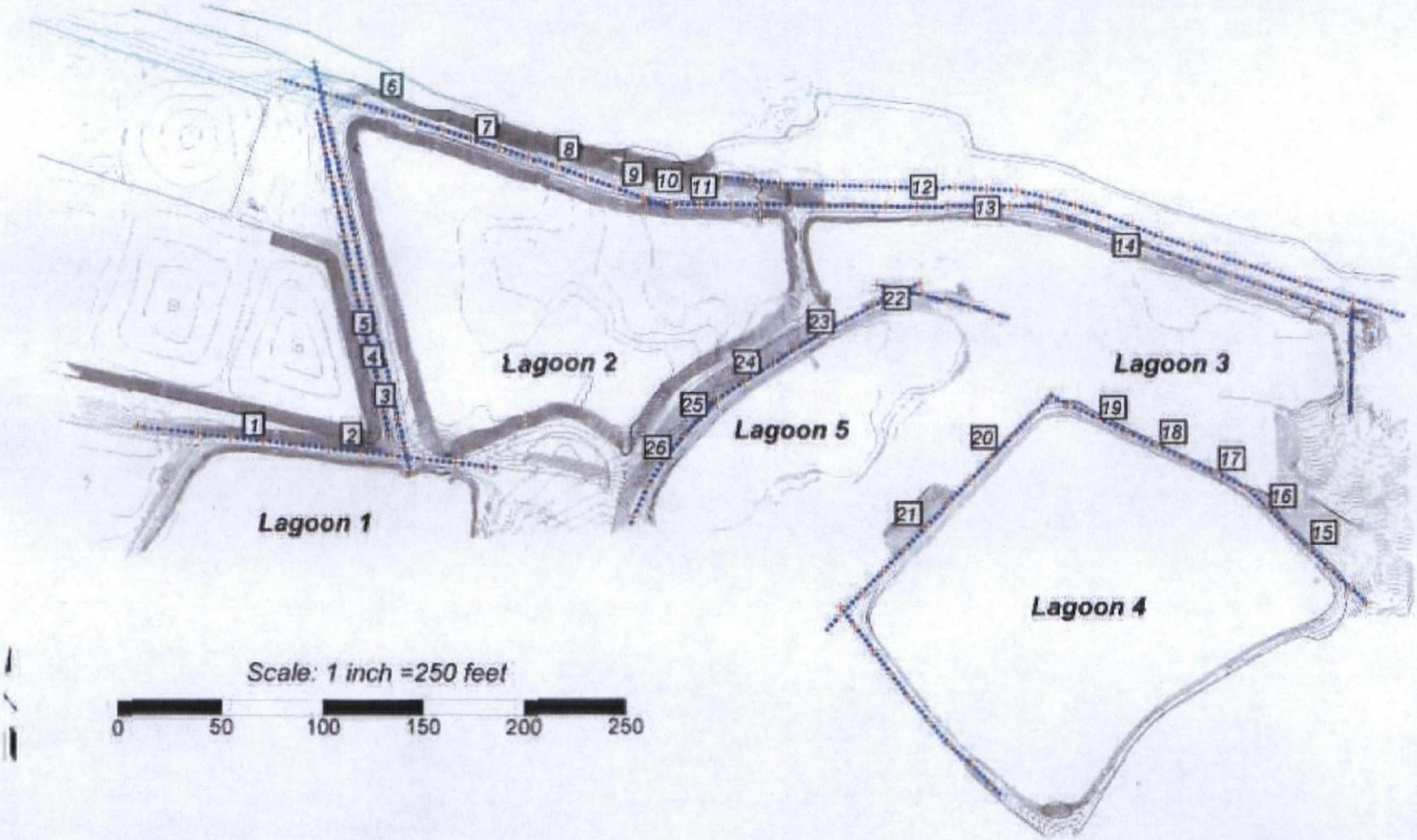
1540 Underhill Ave. Telephone: (540) 853-1283
Roanoke, VA 24014 Email: scott.shirley@westernVAwater.org Fax: (540) 853-1307

ENTERED

subsurface investigative techniques may offer better results based upon geology at the site. Should alternate technologies be suggested, these items will be detailed in the September 9, 2009 submittal. The length of the study period is difficult to fully define, however it is anticipated that the results of this study can be submitted to DEQ-BRRO within 60 days of completion of the field investigation.

If the report identifies anomalies or other data which indicates there may be leakage above the Virginia seepage standards, unless such anomaly or data is otherwise satisfactorily accounted for by other means, the Consultant will assist the Authority in preparation of a workplan to DEQ-BRRO providing for a more intrusive investigation that may include monitoring wells to determine whether Virginia seepage standards are being exceeded.

1540 Underhill Ave. Telephone: (540) 853-1283
Roanoke, VA 24014 Email: scott.shirley@westernVAwater.org Fax: (540) 853-1307



Report Title
Geophysical Evaluation of Berm Integrity for the Western Virginia Water Authority, Roanoke, Virginia

File Name: *WVWA Visual Inspection and Photo Documentation.ppt*

Date: *12/11/09* | Draftsman: *CMP*

ATS Project Number: *P09-34*

Appendix A-1. Locations of photographs in Appendix A-2.

ATS International
Advanced Technical Services
107 Lester Street
Christiansburg, VA 24073
540-382-6851
www.ats-intl.com
Engineering Geology • Hydrogeology • Geophysics
Computer Modeling • Visualization • GIS

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office
www deq virginia gov

L Preston Bryant Jr
Secretary of Natural Resources

David K Paylor
Director

Steven A Dietrich
Regional Director

Lynchburg Office
7705 Timberlake Road
Lynchburg Virginia 24502
(434) 582-5120
Fax (434) 582-5125

Roanoke Office
3019 Peters Creek Road
Roanoke Virginia 24019
(540) 562-6700
Fax (540) 562 6725

August 24, 2009

Mr Scott Shirley, Manager
Western Virginia Water Authority Water Pollution Control Plant
1502 Brownlee Avenue, S E
Roanoke, VA 24014

RE Western Virginia Water Authority Water Pollution Control Plant, VPDES Permit No VA0025020 Approval of Lagoon Structural Integrity Study and Watertight Integrity Study Protocol, Required by Part I D 14 and Part I D 15, Received July 1, 2009, Revised Protocol Received August 17, 2009

Dear Mr Shirley

The above referenced lagoon structural integrity study and watertight integrity study protocol was received on July 1, 2009 and a revised plan was received on August 17, 2009 This study protocol shall address the structural integrity of the berm walls and the watertight integrity of the liners of the five sewage sludge storage lagoons at the WVWA WPCP facility This protocol includes a detailed visual inspection of the entire berm surrounding each lagoon, electromagnetic conductivity around the perimeter of each lagoon, and an electronmagnetic resistivity survey around the perimeter of each lagoon to identify if there are any plumes associated with leakage from the berm liner If berm integrity or seepage problems are found, an additional workplan protocol may be required for review and approval

The combined protocol as required by Part I D 14 and Part I D 15 is approved Please begin the studies as defined in the protocol schedule of your report Should you have any questions, please contact Becky L France at 540-562-6793

Sincerely,

Steven A Dietrich, P E
Blue Ridge Office Regional Director

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(147)

Attachment U

Public Notice and Comments

PUBLIC NOTICE – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Roanoke City, Virginia
PUBLIC COMMENT PERIOD: January 18, 2014 through February 18, 2014
PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board
APPLICANT NAME, ADDRESS, AND PERMIT NUMBER: Western Virginia Water Authority. 1502 Brownlee Avenue, S.E., Roanoke, VA 24014, VA0025020
FACILITY NAME AND LOCATION: Western Virginia Water Authority Water Pollution Control Plant, 1502 Brownlee Avenue, S.E., Roanoke, VA 24014
PROJECT DESCRIPTION: The Western Virginia Water Authority has applied for a reissuance of a permit for the wastewater treatment plant in Roanoke City. The applicant proposes to release treated sewage wastewater from residential areas and treated industrial wastewaters at a rate of 55 million gallons per day from the current facility into a water body with a proposed upgrade to 62 million gallons per day. Storm water will also be released. The permittee is authorized to generate biosolids and provide them to a contractor permitted to land apply them in Virginia in accordance with biosolids permit numbers BUR 79 and BUR 114. Biosolids from the treatment process will be periodically land applied at agronomic rates to fields located in Franklin and Bedford Counties. The proposed reissuance contains requirements that biosolids comply with cumulative pollutant loading rates for metals, Class B pathogen requirements, and vector reduction requirements. The facility proposes to release the treated sewage and storm water into the Roanoke River in Roanoke City in the Roanoke River Watershed (VAW-L04R). A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: bacteria, nutrients, organic matter, solids, toxic pollutants, dissolved oxygen
HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax, or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for a public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if a public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.
CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS, AND ADDITIONAL INFORMATION:
Becky L. France; ADDRESS: Virginia Department of Environmental Quality, Blue Ridge Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019-2738; (540) 562-6700; E-MAIL ADDRESS: becky.france@deq.virginia.gov; FAX: (540) 562-6725. The public may review the draft permit and application at the DEQ office named above (by appointment) or may request copies of the documents from the contact person listed above.

France, Becky (DEQ)

From: Smith, Mark [Smith.Mark@epa.gov]
Sent: Friday, February 14, 2014 10:27 AM
To: Daub, Elleanore (DEQ); France, Becky (DEQ)
Cc: Trulear, Brian
Subject: FW: Major Municipal Draft VPDES Reissuance Permit for WVWA WPCP VA0025020

Hello Elleanore and Becky. We received the draft permit for the WVWA WPCP (VA0025020) on 1/15/14 and the revised draft permit on 2/4/14. EPA exercised its discretion in the review of this State-submitted draft permit and has chosen to perform a limited review on the TMDL requirements. As a result of this limited review of the draft permit, we wish to provide the following comments. Permits that received waste load allocations per an approved TMDL should express those waste load allocations in the permit. Recurrent monitoring should be employed to verify that those waste load allocations are being maintained. In the case where pollutant minimization plans are being implemented some recurrent monitoring should be conducted to gauge the results of the minimization efforts and to inform future actions. In the case of PCB monitoring, the more sensitive PCB test method EPA Method 1668A should be used. Thanks

---

From: France, Becky (DEQ) [mailto:Becky.France@deq.virginia.gov]
Sent: Tuesday, February 04, 2014 3:40 PM
To: Smith, Mark
Cc: Foster, Kip (DEQ)
Subject: FW: Major Municipal Draft VPDES Reissuance Permit for WVWA WPCP VA0025020

In response to permittee and staff reviews, I have made some revisions in the draft permit for WVWA WPCP (VA0025020). The changes are described on page 30 under "Staff Comments" of the Fact Sheet. Most of the changes have been made in response to changes in the storm water and biosolids regulations and to address typographical errors. The latest draft is titled "16Permit..." and "16Fact Sheet....". The link is given in the e-mail below. Please provide your comments on this draft permit.

In our telephone conversation today you had some comments and concerns about PCBs. After speaking with you about PCBs I looked over the information I had. When I began writing the permit, I consulted with the TMDL staff and was given written guidance (August 20, 2013) from DEQ Central Office that further PCB monitoring was not needed because the PCB data (complete set) were below the wasteload allocation (as per approved Roanoke River TMDL report). As a result, I told the permittee several months ago that I did not think additional PCB monitoring would be necessary. Since my initial correspondence with the TMDL staff, I have not talked with them to see if there have been any changes in the PCB monitoring approach for facilities in a PCB TMDL segment. But, I am not aware of anything new. Please send me any comments you have about PCBs so that I may discuss them with Agency TMDL staff. If you have any more questions or need more information, please give me a call and we can discuss further.

From: France, Becky (DEQ)
Sent: Wednesday, January 15, 2014 12:06 PM
To: 'Smith.Mark@epamail.epa.gov'
Subject: Major Municipal Draft VPDES Reissuance Permit for WVWA WPCP VA0025020

In accordance with the Memorandum of Understanding regarding permit and enforcement programs between this Agency and the Regional Administrator of Region III U.S. EPA, documentation supporting reissuance of the VPDES permit for WVWA WPCP is included in the following link below. The following documents are attached for your review: application, draft permit, draft Fact Sheet, and Fact Sheet Attachments.

This proposed permit reissuance is for a major municipal facility in Roanoke City, Virginia. The facility currently has a design capacity of 55 MGD.

If EPA does not comment or object within 30 days of receipt of this notification, processing of the referenced permit will be deemed acceptable to the Regional Administrator. Please let us know if you need additional information to complete your review.

http://www.deq.virginia.gov/fileshare/wps/EPA/WCRO/Draft VA0025020 WVWA WPCP/

Becky L. France
Water Permit Writer
Department of Environmental Quality
3019 Peters Creek Road
Roanoke, VA 24019
(540) 562-6793
E-mail: Becky.France@deq.virginia.gov
Web: http://www.deq.virginia.gov

France, Becky (DEQ)

From: Hoffman, Lawrence [LHoffman@chacompanies.com]
Sent: Friday, February 14, 2014 11:18 AM
To: France, Becky (DEQ)
Cc: Scott.Shirley@WesternVaWater.org; Martin.Sensabaugh@WesternVaWater.org; Janis.Richardson@WesternVaWater.org
Subject: RE: Major Municipal Draft VPDES Reissuance Permit for WVWA WPCP VA0025020

Thanks for forwarding this to us Becky. I understand the need for continued monitoring for facilities that require a pollutant minimization plan as specifically referenced from Mark as follows:

In the case where pollutant minimization plans are being implemented some recurrent monitoring should be conducted to gauge the results of the minimization efforts and to inform future actions.

To me, this makes sense. For facilities such as WVWA that performed both wet-weather and dry-weather monitoring and showed that the PCB content in their discharge is below the waste load allocation (and don't require a pollutant minimization plan), I'm not sure additional monitoring is helpful or necessary in large part because PCBs are no longer being produced and they are no longer in general use. Thus, effluent PCBs in shouldn't be expected to significantly increase in the discharge relative to historical monitoring results. The basis for the existing TMDL and the source of the PCBs in fish tissue and sediment is from legacy PCB users located upstream of the WVWA facilities.

In addition, PCB monitoring using EPA Method 1668 is complex, vulnerable to contamination, and we are concerned about the reliability of the data generated using the current methodology. Even with the use of "clean" sampling and analytical procedures, trace contamination during sample collection or laboratory analysis can significantly impact the results "measured" in the parts per quadrillion range. Further, it is our understanding that EPA Method 1668 has not been included in 40 CFR Part 136 as an approved compliance monitoring method.

In light of these issues and concerns, we request that the draft permit not be revised to include PCB monitoring. Please let me know if you have any questions or wish to discuss this in more detail.

Lawrence

R. Lawrence Hoffman
Vice President
CHA ~ *design/construction solutions*

540.552.5548
lhoffman@chacompanies.com
www.chacompanies.com

From: France, Becky (DEQ) [mailto:Becky.France@deq.virginia.gov]
Sent: Friday, February 14, 2014 10:33 AM
To: Hoffman, Lawrence; Scott.Shirley@WesternVaWater.org
Subject: FW: Major Municipal Draft VPDES Reissuance Permit for WVWA WPCP VA0025020

FYI

From: Smith, Mark [mailto:Smith.Mark@epa.gov]
Sent: Friday, February 14, 2014 10:27 AM
To: Daub, Elleanore (DEQ); France, Becky (DEQ)