APPENDIX A

FACILITY INFORMATION

NPDES Permit Rating Worksheet
USGS Map
Site/Flow Diagram
Site Visit Memo
DMR Data

NPDES PERMIT RATING WORK SHEET

☐ Regular Addition
☐ DiscretionaryAddition
☐ Score change, but no status change
☐ Deletion

NPDES NO. VA0076015

Facility Name: Ronile, Inc.

City: Rocky Mount

Receiving Water: Pigg River

Reach Number:

Is this facility a steam electric power plant (SIC=4911) with one or more of the following characteristics?
1. Power output 500 MW or greater (not using a cooling pond/lake)
2. A nuclear power plant
3. Cooling water discharge greater than 25% of the receiving stream's 7Q10 flow rate
☐ YES; score is 600 (stop here) X NO (continue)

Is this permit for a municipal separate storm sewer serving a population greater than 100,000?

☐ YES; score is 700 (stop here)
X NO (continue)

FACTOR 1: Toxic Pollutant Potential

PCS SIC Code: Primary SIC Code: 2269 Other SIC Codes: 4961
Industrial Subcategory Code: 002 (Code 000 if no subcategory)

Determine the Toxicity potential from Appendix A. Be sure to use the TOTAL toxicity potential column and check one)

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
☐ No process waste streams	0	0	☐ 3.	3	15	☐ 7.	7	35
☐ 1.	1	5	☐ 4.	4	20	☐ 8.	8	40
☐ 2.	2	10	☐ 5.	5	25	X 9.	9	45
			☐ 6.	6	30	☐ 10.	10	50

Code Number Checked: 9

Total Points Factor 1: 45

FACTOR 2: Flow/Stream Flow Volume (*Complete either Section A or Section B; check only one)*

Section A ☐ Wastewater Flow Only Considered

Wastewater Type (See Instructions)		Code	Points
Type I: Flow < 5 MGD	☐	11	0
Flow 5 to 10 MGD	☐	12	10
Flow > 10 to 50 MGD	☐	13	20
Flow > 50 MGD	☐	14	30
Type II: Flow < 1 MGD	☐	21	10
Flow 1 to 5 MGD	☐	22	20
Flow > 5 to 10 MGD	☐	23	30
Flow > 10 MGD	☐	24	50
Type III: Flow < 1 MGD	☐	31	0
Flow 1 to 5 MGD	☐	32	10
Flow > 5 to 10 MGD	☐	33	20
Flow > 10 MGD	☐	34	30

Section B ☐ Wastewater and Stream Flow Considered

Wastewater Type (See Instructions)	Percent of instream Wastewater Concentration at Receiving Stream Low Flow		Code	Points
Type I/III:	< 10 %	☐	41	0
	10 % to < 50 %	☐	42	10
	> 50 %	☐	43	20
Type II:	< 10 %	X	51	0
	10 % to <50 %	☐	52	20
	> 50 %	☐	53	30

Code Checked from Section A or B: 51
Total Points Factor 2: 0

FACTOR 3: Conventional Pollutants NPDES NO: VA0076015
(only when limited by the permit)

A. Oxygen Demanding Pollutant: (check one) ☐ BOD X COD ☐ Other:_____

			Code	*Points*
Permit Limits: (check one)	☐	< 100 lbs/day	1	0
	☐	100 to 1000 lbs/day	2	5
	X	> 1000 to 3000 lbs/day	3	15
	☐	> 3000 lbs/day	4	20

Code Checked: __3__

Points Scored:__15__

B. Total Suspended Solids (TSS)

			Code	*Points*
Permit Limits: (check one)	☐	< 100 lbs/day	1	0
	X	100 to 1000 lbs/day	2	5
	☐	> 1000 to 5000 lbs/day	3	15
	☐	> 5000 lbs/day	4	20

Code Checked: __2__

Points Scored: __5__

C. Nitrogen Pollutant: (check one) ☐ Ammonia ☐ Other: _____

		Nitrogen Equivalent	*Code*	*Points*
Permit Limits: (check one)	☐	< 300 lbs/day	1	0
	☐	300 to 1000 lbs/day	2	5
	☐	> 1000 to 3000 lbs/day	3	15
	☐	> 3000 lbs/day	4	20

Code Checked: __1___

Points Scored:_0____

Total Points Factor 3: _20__

FACTOR 4: Public Health Impact

Is there a public drinking water supply located within 50 miles downstream of the effluent discharge (this includes any body of water to which the receiving water is a tributary)? A public drinking water supply may include infiltration galleries, or other methods of conveyance that ultimately get water from the above referenced supply.

☐ YES (If yes, check toxicity potential number below)

X NO (If no, go to Factor 5)

Determine the *human health* toxicity potential from Appendix A. Use the same SIC code and subcategory reference as in Factor 1. (Be sure to use the human health toxicity group column ☐ check one below)

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
☐ No process waste streams	0	0	☐ 3.	3	0	☐ 7.	7	15
☐ 1.	1	0	☐ 4.	4	0	☐ 8.	8	20
☐ 2.	2	0	☐ 5.	5	5	☐ 9.	9	25
			☐ 6.	6	10	☐ 10.	10	30

Code Number Checked: __0__NA

Total Points Factor 4:__0__

FACTOR 5: Water Quality Factors NPDES NO VA0076015

A. Is (or will) one or more of the effluent discharge limits based on water quality factors of the receiving stream (rather than technology-based federal effluent guidelines, or technology-based state effluent guidelines), or has a wasteload allocation been assigned to the discharge:

		Code	Points
X	Yes	1	10
☐	No	2	0

B. Is the receiving water in compliance with applicable water quality standards for pollutants that are water quality limited in the permit?

		Code	Points
X	Yes	1	0
☐	No	2	5

C. Does the effluent discharged from this facility exhibit the reasonable potential to violate water quality standards due to whole effluent toxicity?

		Code	Points
X	Yes	1	10
☐	No	2	0

Code Number Checked: A 1 B 1 C 1

Points Factor 5: A 10 + B 0 + C 10 = 20 TOTAL

FACTOR 6: Proximity to Near Coastal Waters

A. Base Score: Enter flow code here (from Factor 2): ___ *Enter the multiplication factor that corresponds to the flow code:* _____

Check appropriate facility HPRI Code (from PCS):

	HPRI#	*Code*	*HPRI Score*
☐	1	1	20
☐	2	2	0
☐	3	3	30
X	4	4	0
☐	5	5	20

HPRI code checked: 4

Flow Code	*Multiplication Factor*
11, 31, or 41	0.00
12, 32, or 42	0.05
13, 33, or 43	0.10
14 or 34	0.15
21 or 51	0.10
22 or 52	0.30
23 or 53	0.60
24	1.00

Base Score: (HPRI Score) 0 X (Multiplication Factor) ___ = 0 (TOTAL POINTS)

B. Additional Points ☐ NEP Program
For a facility that has an HPRI code of 3, does the facility discharge to one of the estuaries enrolled in the National Estuary Protection (NEP) program (see instructions) or the Chesapeake Bay?

	Code	Points
☐ Yes	1	10
☐ No	2	0

C. Additional Points ☐ Great Lakes Area of Concern
For a facility that has an HPRI code of 5, does the facility discharge any of the pollutants of concern into one of the Great Lakes' 31 areas of concern (see Instructions)

	Code	Points
☐ Yes	1	10
☐ No	2	0

Code Number Checked: A __ B __ C __

Points Factor 6: A __ + B __ + C __ = 0 TOTAL

SCORE SUMMARY NPDES NO. VA0076015

Factor	Description	Total Points
1	Toxic Pollutant Potential	45
2	Flows/Streamflow Volume	
3	Conventional Pollutants	20
4	Public Health Impacts	
5	Water Quality Factors	20
6	Proximity to Near Coastal Waters	
	TOTAL (Factors 1 through 6)	85

S1. Is the total score equal to or greater than 80? X Yes (Facility is a major) ☐ No

S2. If the answer to the above questions is no, would you like this facility to be discretionary major?

☐ No

☐ Yes (Add 500 points to the above score and provide reason below:

Reason:

NEW SCORE: 85

OLD SCORE: 85

Lewis J. Pillis
Permit Reviewer's Name

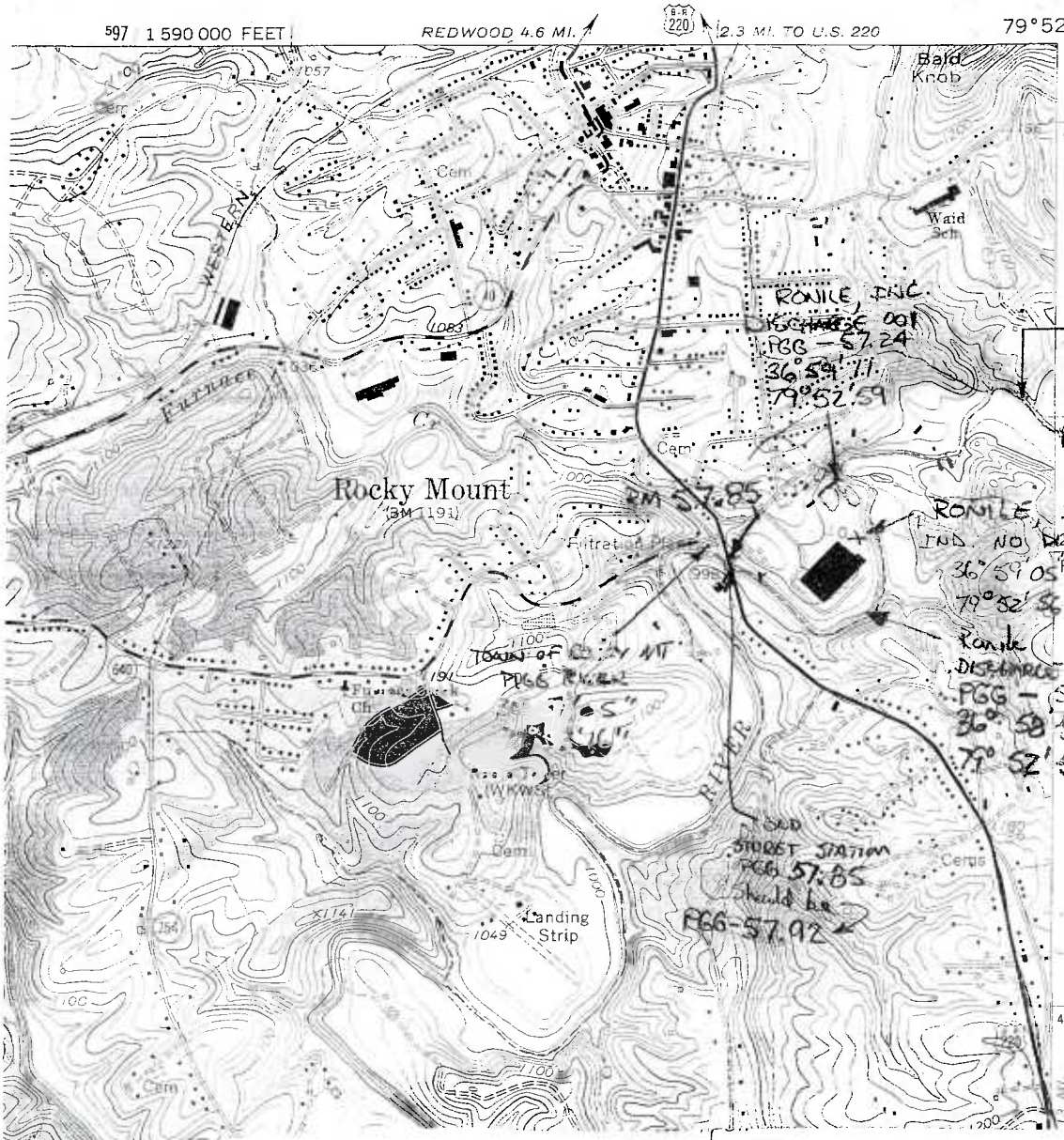
(540) 562-6789
Phone Number

July 23, 2018
Date

ROCKY MOUNT QUADRANGLE
VIRGINIA—FRANKLIN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

5058 III SE (REDWOOD)

597 1 590 000 FEET



SCALE 1:24 000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET

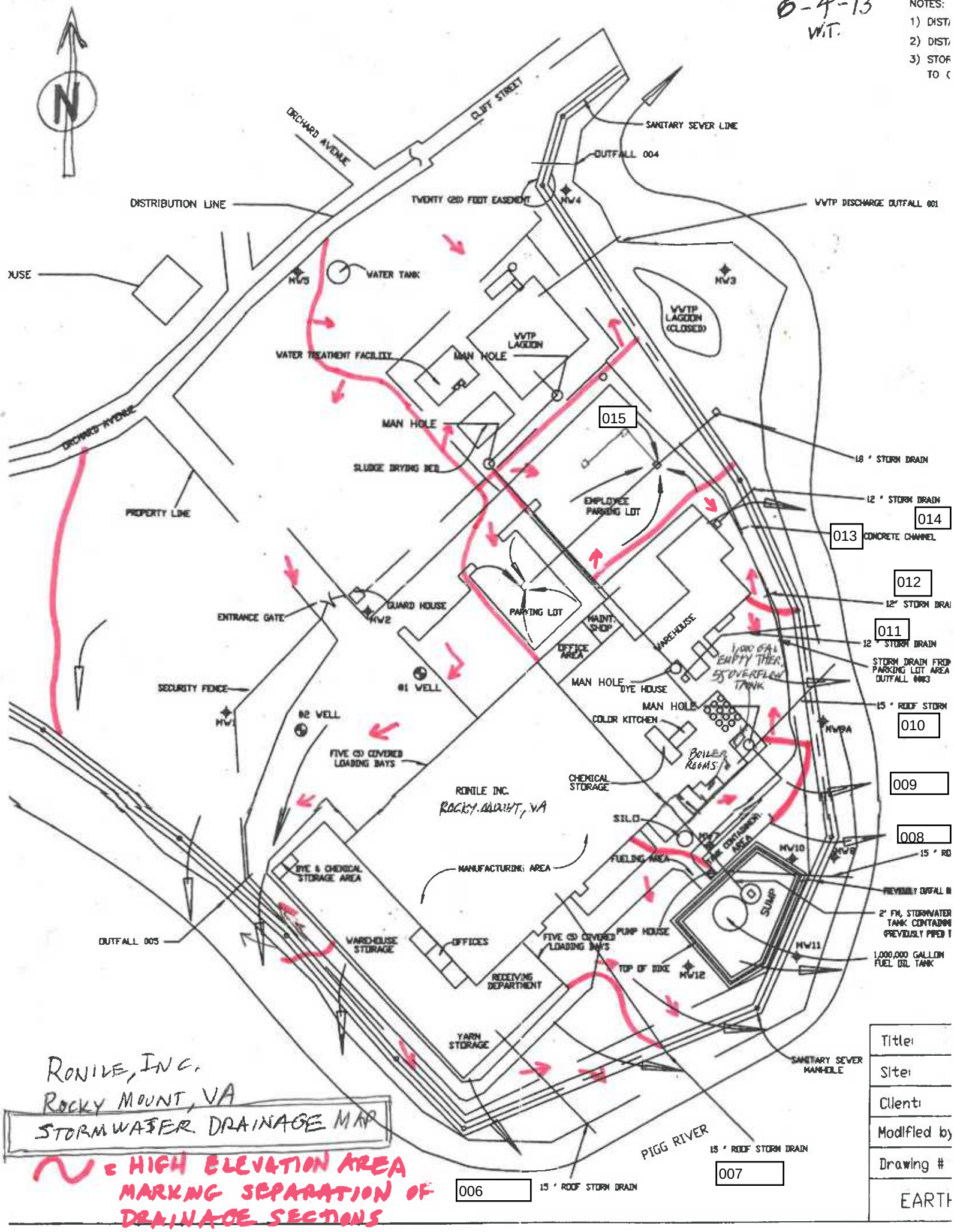
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092

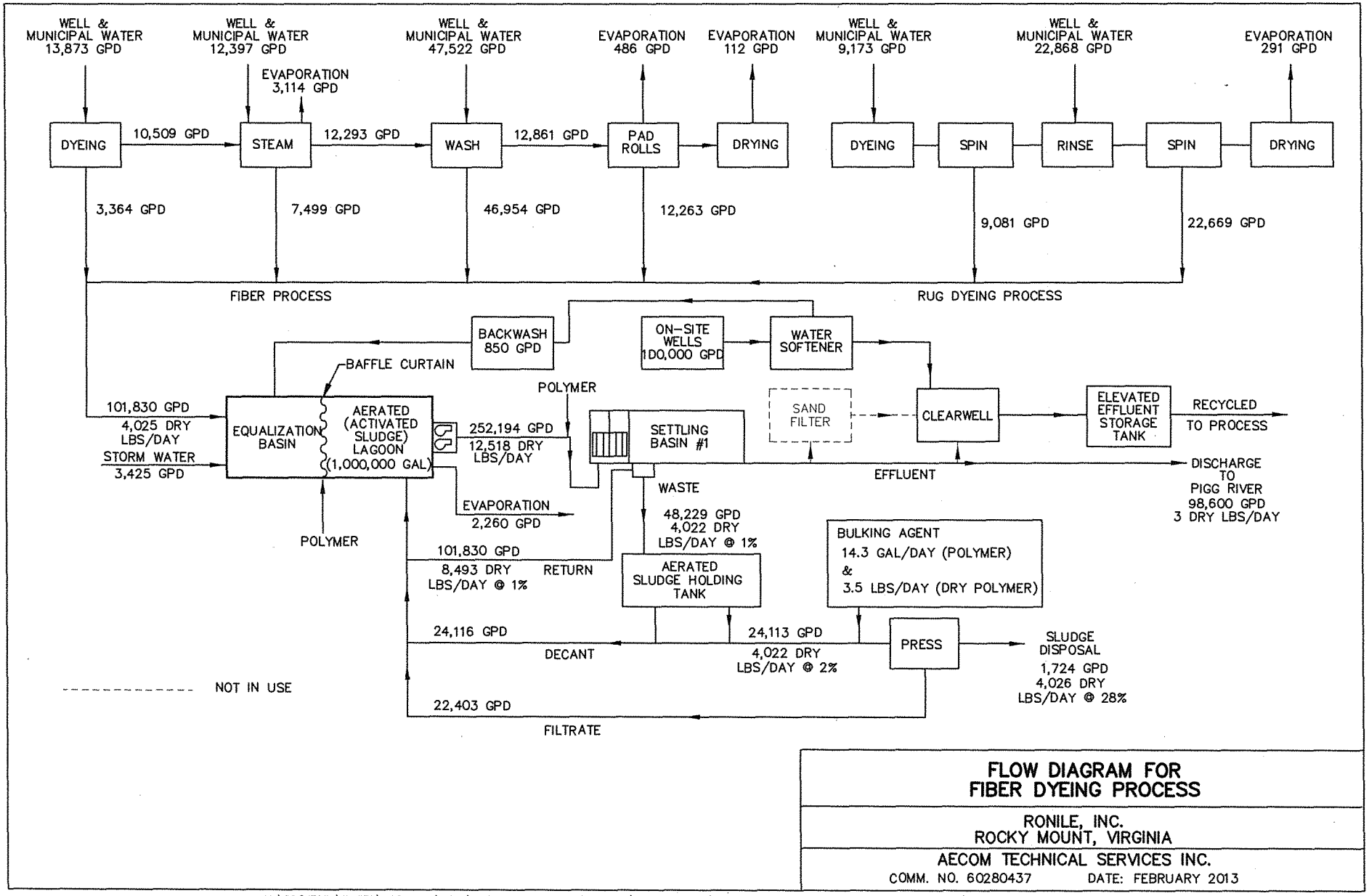
AND VIRGINIA DIVISION OF MINERAL RESOURCES, CHARLOTTESVILLE, VIRGINIA 22903

A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



RONILE, INC.
ROCKY MOUNT, VA
STORMWATER DRAINAGE MAP

~ = HIGH ELEVATION AREA MARKING SEPARATION OF DRAINAGE SECTIONS



FLOW DIAGRAM FOR FIBER DYEING PROCESS

RONILE, INC.
ROCKY MOUNT, VIRGINIA

AECOM TECHNICAL SERVICES INC.
COMM. NO. 60280437 DATE: FEBRUARY 2013

M:\PROJECTS\WATER\60280437\0001\400_TECHNICAL_INFORMATION\414_PROCESS\VPDES PERMIT RENEWAL 2012\2012 DRAWINGS\FLOW DIAGRAM 2012.DWG 61002 03/19/2013 15:17:56 GEARHART, DANIEL
RF: NONE IMG: NONE

Ronile Inc., MSDSs reviewed:

110-10003	ACID YELLOW 4NGL 200% Monoazo	109092	ACID YELLOW 4NGL 200% >50% CAS# 69762-08-9	Color sources, Inc.	10 lb
120-10018	LEVELER PPL	127670	LEVELER PPL	Piedmont Chemical Ind Inc	10
120-10506	VERSATINT SUPRA GREEN	123900	VERSATINT SUPRA GREEN	Milliken & Company	15
110-10069	ACID RED 2G Monoazo dye	109092	ACID RED 2G 12270-02-9	Color sources, Inc.	30
110-10034	ASTRAZON BRILL RED 4GN 200 (basic red 14, a methine dyestuff)	110085	DORACREL BRIL RED X4GS 200% CAS# 72208-31-0	M Dohmen USA, Inc	35
120-10028	CARRIER NOC	127670	CARRIER NOC	Piedmont Chemical Ind Inc	50
120-10503	MUANOX CONC	127490	MUANOX CONC	Peachstate Labs Inc	60
110-10386	ACID RED 2B	111840	DYE O NYL RED 2B CAS# 61931-22-4	Dye-O-Chem, American Inc	65
110-10425 **H400, H410***	ACRYLIC YELLOW X8G Aquatic Acute1 & Chronic 1 Basic dye	110085	Doracryl yellow X8GLS 200% 25-50% CAS# 25717-55-9	M Dohmen USA, Inc	65
110-10026	ACID ORANGE 3G 200% AKA Acid orange 156	113200 contains	FOURACID ORANGE 3G 200 Sodium tripolyphosphate	Fibro Chem Inc	80
110-10085	TELON BLACK BLD 100%	109092	ACID BLACK 2S-LD	ColorSources, Inc.	100
110-10427	DORACRYL FAVINE X10G 600% a methine dyestuff	110085	DORACRYL FAVINE X10G 600%	M Dohmen USA, Inc	110
120-10389	SODIUM HYDROSULFITE WRM	128900	PRES CLEAR WRM	Prescott Chemical Inc	125
110-10387	ACID BLUE BRL 200%	108500	TECTILON BLUE M-AR	Huntsman International, LLC	160
110-10033	ASTRAZON BLUE BG 200% Basic dye	110085	DORACRYL BLUEGREEN X5GS 200 CAS#33203-82-6	M Dohmen USA, Inc	175
110-10364	PREMET BORDEAUX R CI acid red 182	120255	KEMALAN BORDEAUX K-RL CAS# 5802-43-5	Jaychem LLC	190

110-10366	ACRYLIC RED GRL	110085	DORACRYL RED XGRLS 200%	M Dohmen USA, Inc		210
H412*	Aquatic Chronic 3 Azo dyestuff		>25% CAS# 93804-07-0			
110-10035	ASTRAZON RED VLT 3RNO1	110085	DORACRYL BRILL RED XBG	M Dohmen USA, Inc		
H410*	Basic dye		60-70% CAS# 6359-45-1			220
110-10363	PREMET YELLOW LNW 250%	113200	FOURACID YELLOW NW 250	Fibro Chem Inc		
	Metal complex dye contains cobalt					230
110-10032	ACRYLIC BLUE FGGL 300%	110085	DORACRYL BLUE X3GLS 300	M Dohmen USA, Inc		
	Monoazo dyestuff		CAS# 12270-13-2	Basic blue 41 (zinc free)		425
110-10054	PREMET BLACK BGL 200%	111840	DYE-O-LAN BLACK BGL 200%	Dye-O-Chem, American Inc		
	Acid black 1, CI acid black 107		CAS# 12218-96-1			450
120-10401	ASTRAGAL PAN-02	104255	ASTRAGAL PAN-02	StarChem LLC	X	450
110-10021						
H400, H410*	ACRYLIC GOLDEN YEL GL 200	110085	DORACRYL GOLD YELLOW XGFLS	M Dohmen USA, Inc		
	Aquatic Acute 1 &Chronic 1 – Basic		200 45-55% CAS# 38936-35-5			530
120-10016	Buffer 5 Tote	127670	Buffer 5 Tote	Piedmont Chemical Ind Inc		495
120-10339	PRO GUM 493/Aqualon 49323 GUAR	113200	GALACTASOL 20H5FD GUAR	Fibro Chem Inc		750
120-10036	WETTER D-90	127670	WETTER D-90	Piedmont Chemical Ind Inc		950
120-10060	BUFFER R	127670	BUFFER R	Piedmont Chemical Ind Inc		950
120-10493	SYNTHASIL SW 216	127670	SYNTHASIL SW 216	Piedmont Chemical Ind Inc		1,025
120-10051	NOVOC A-80	127490	NOVOC A-80	Peachstate Labs Inc		1,100
120-10005	POMOCO 1014T DRUM	127670	POMOCO 1014T	Piedmont Chemical Ind Inc		1,350
120-10047	FOAM PRESS 50	128900	FOAM PRESS 50	Prescott Chemical Inc		1,700
120-10019	FORMAC 50% BULK		N/A	#N/A		1,793
120-10080	POLYWET 750 DE		N/A	#N/A		3,227

120-10502	POMOLUBE TXJ-22	127670	POMOLUBE TXJ-22	Piedmont Chemical Ind Inc		4,050
120-10048	ACETIC ACID 56% TOTE	105902	ACETIC ACID 56%	Brenntag Southeast		4,780
120-10004	POMOSOFT 540	127670	POMOSOFT 540	Piedmont Chemical Ind Inc		5,250
120-10050	NICCA-RESIST SB-4	124636	NICCARESIST SB-4	Nicca USA Inc	X	5,685

Environmental hazards from Globally Harmonized System of Classification and Labelling of Chemicals (GHS);
not adopted by all dye manufacturers:
H400: Very toxic to aquatic life
H401: Toxic to aquatic life
H402: Harmful to aquatic life
H410: Very toxic to aquatic life with long-lasting effects (Aquatic Chronic)
H411: Toxic to aquatic life with long-lasting effects
H412: Harmful to aquatic life with long-lasting effects (Aquatic Chronic)
H413: May cause long-lasting harmful effects to aquatic life

Ronile Inc

VA0076015 Outfall 001

		FLOW, MGD			pH, SU		BOD5, mg/L		COD, mg/L	TSS, mg/L		Zn, ug/L	Cu, ug/L	Cr, mg/L	Phenolics, mg/L		Phenolics, Kg/D		Color, ADMI
		Mo. Ave	An. Ave.	Max	Min	Max	ave	max		ave	max				ave	max	ave	max	
	limit=>				*6.0*	*9.0*	*NL*	*NL*	*NL*	*NL*	*NL*	*140*	*20*	*NL*	*NL*	*NL*	*0.97*	*1.9*	*499*
2015	5	0.09		0.117	7.34	7.98	<QL	<QL	80	6.1	8	70	<QL	<QL	0.03	0.04	0.01	0.02	124
	6	0.087		0.114	7	8.26	1.7	5	111	7.3	9	62	<QL	<QL	0.03	0.03	0.01	0.01	243
	7	0.076		0.107	7.1	7.77	<QL	<QL	81	9	16	77	<QL	<QL	0.02	0.03	0.01	0.01	274
	8	0.085		0.119	7.14	8.12	1.8	5.5	118	9	15	42	<QL	0.1	0.02	0.02	0.01	0.01	290
	9	0.105		0.128	6.72	7.95	<QL	<QL	84	9	14	70	<QL	<QL	0.01	0.01	0.01	0.01	248
	10	0.105		0.129	7.07	**8.58**	<QL	<QL	55	11	13	45	<QL	<QL	0.01	0.02	0	0.01	148
	11	0.097		0.133	7.14	7.84	2.9	6.5	55	12	15	56	<QL	<QL	<QL	<QL	<QL	<QL	222
	12	0.097	0.092	0.126	7.11	7.84	1.5	6	55	10	12	110	<QL	<QL	0.012	0.014	0.01	0.01	182
2016	1	0.09		0.118	7.27	7.95	3.6	7.7	66	14	20	89	<QL	<QL	0.03	0.05	0.01	0.02	138
	2	0.148		0.189	7.28	8.26	<QL	<QL	77	8	23	110	<QL	<QL	0.01	0.01	0.01	0.01	104
	3	**0.158**		**0.2**	6.72	7.98	<QL	<QL	63	11	20	89	<QL	<QL	0.03	0.06	0.01	0.02	136
	4	0.15		0.186	6.86	7.42	<QL	<QL	62	6	7	81	<QL	<QL	0.02	0.03	0.01	0.01	135
	5	0.104		0.137	6.86	7.42	<QL	<QL	54	6	8	50	<QL	<QL	0.01	0.02	0.01	0.01	165
	6	0.095		0.118	6.69	7.42	<QL	<QL	56	10	18	57	<QL	<QL	0.02	0.02	0.01	0.01	248
	7	0.083		0.11	6.44	7.7	<QL	<QL	73	11	19	44	<QL	<QL	0.04	0.04	0.01	0.02	249
	8	0.098		0.127	6.58	7.42	<QL	<QL	72	9	13	48	<QL	<QL	0.03	0.03	0.01	0.02	262
	9	0.103		0.126	6.71	7.58	1.9	5.7	146	6	7	43	<QL	<QL	0.03	0.05	0.01	0.02	189
	10	0.105		0.125	6.83	7.33	<QL	<QL	58	5	8	73	<QL	<QL	0.02	0.02	0.01	0.01	163
	11	0.115		0.132	7.23	7.56	<QL	<QL	58	3	4	37	<QL	<QL	0.04	0.04	0.02	0.02	150
	12	0.12	0.114	0.153	7.08	7.84	3	6	78	4	5	61	<QL	<QL	0.06	0.12	0.03	0.06	111
2017	1	0.106		0.144	7	7.7	1.7	5.2	119	5	7	95	<QL	<QL	0.07	0.1	0.03	0.05	123
	2	0.1		0.129	7	7.28	<QL	<QL	84	5	7	41	<QL	<QL	0.07	0.09	0.03	0.04	124
	3	0.107		0.133	6.44	7.48	<QL	<QL	75	3	8	47	<QL	0.01	0.01	0.02	0.01	0.01	131
	4	0.108		0.14	6.77	7.42	<QL	<QL	62	3	4	45	<QL	<QL	0.025	0.026	0.012	0.013	138
	5	0.101		0.135	6.8	7.56	<QL	<QL	67	3	3	52	<QL	0.02	<QL	<QL	<QL	<QL	151
	6	0.097		0.135	6.86	7.56	<QL	<QL	68	4	7	32	<QL	<QL	0.02	0.02	0.01	0.01	175
	7	0.102		0.128	6.86	7.32	<QL	<QL	70	3	3	45	<QL	<QL	0.01	0.01	0.01	0.01	218
	8	0.103		0.14	6.72	7.42	<QL	<QL	70	2	2	65	<QL	<QL	<QL	<QL	<QL	<QL	212
	9	0.118		0.14	6.58	7.42	<QL	<QL	62	6	13	51	<QL	<QL	0.01	0.01	0	0.01	188
	10	0.114		0.139	6.72	7.28	<QL	<QL	59	3	3	52	<QL	<QL	<QL	<QL	<QL	<QL	176
	11	0.118		0.152	6.72	7.56	<QL	<QL	45	2	3	82	<QL	<QL	<QL	<QL	<QL	<QL	222
	12	0.087	0.105	0.134	6.72	7.56	<QL	<QL	70	4	8	74	<QL	<QL	0.01	0.02	0.01	0.01	154
2018	1	0.095		0.147	6.78	7.6	5	25.1	131	4	12	47	<QL	<QL	<QL	<QL	<QL	<QL	160
	2	0.115		0.146	6.86	7.44	<QL	<QL	113	3	5	42	<QL	<QL	0.007	0.022	0.004	0.011	188
	3	0.119		0.145	6.86	7.62	<QL	<QL	64	2	3	68	<QL	0.01	<QL	0.01	<QL	0.01	134
	4	0.111		0.143	6.86	7.47	<QL	<QL	70	4	6	21	<QL	<QL	0.022	0.032	0.011	0.017	170
		0.106		0.2	6.44	8.58	results show toxicity in BOD test					60.4							290 max
		LT ave		max	min	max						ave							179 ave

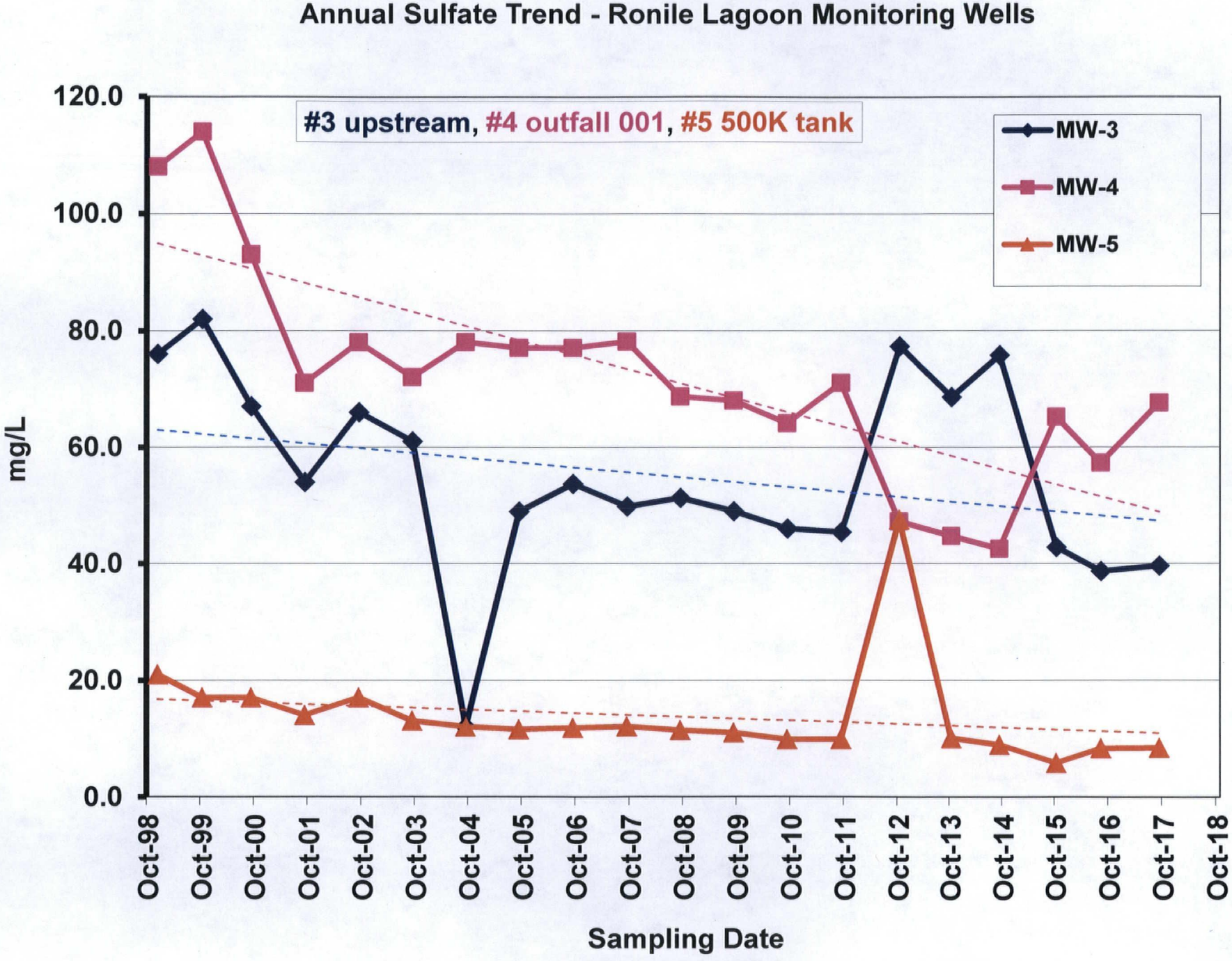
Note: O&G and total sulfides were <QL for all months

Ronile Inc

VA0076015 Outfall 001

Evaluation to see if tocxicity is evident in BOD tests.

		BOD5, mg/L ave	BOD5, mg/L max	BOD <QL=2	COD, mg/L	COD/BODave ratio	COD/BODmax ratio	Zn, ug/L	TUa
2015	5	<QL	<QL	2	80		40	62	
	6	1.7	5	5	111	65	22	77	<1.0
	7	<QL	<QL	2	81		41	42	
	8	1.8	5.5	5.5	118	66	21	70	
	9	<QL	<QL	2	84		42	45	<1.00
	10	<QL	<QL	2	55		28	56	
	11	2.9	6.5	6.5	55	19	8	110	
	12	1.5	6	6	55	37	9	89	<1.0
2016	1	3.6	7.7	7.7	66	18	9	110	
	2	<QL	<QL	2	77		39	89	
	3	<QL	<QL	2	63		32	81	<1.0
	4	<QL	<QL	2	62		31	50	
	5	<QL	<QL	2	54		27	57	
	6	<QL	<QL	2	56		28	44	<1.0
	7	<QL	<QL	2	73		37	48	
	8	<QL	<QL	2	72		36	43	
	9	1.9	5.7	5.7	146	77	26	73	<1.0
	10	<QL	<QL	2	58		29	37	
	11	<QL	<QL	2	58		29	61	
	12	3	6	6	78	26	13	95	<1.0
2017	1	1.7	5.2	5.2	119	70	23	41	
	2	<QL	<QL	2	84		42	47	
	3	<QL	<QL	2	75		38	45	1.23
	4	<QL	<QL	2	62		31	52	
	5	<QL	<QL	2	67		34	32	
	6	<QL	<QL	2	68		34	45	<1.0
	7	<QL	<QL	2	70		35	65	
	8	<QL	<QL	2	70		35	51	
	9	<QL	<QL	2	62		31	52	1.41
	10	<QL	<QL	2	59		30	82	
	11	<QL	<QL	2	45		23	74	
	12	<QL	<QL	2	70		35	47	1.42
2018	1	5	25.1	25.1	131	26	5	42	
	2	<QL	<QL	2	113		57	68	
	3	<QL	<QL	2	64		32	21	3.27
	4	<QL	<QL	2	70		35	42	
						26 to 77	5 to 57		
						ave = 45	ave = 30		


Annual Sulfate Trend - Ronile Lagoon Monitoring Wells
#3 upstream, #4 outfall 001, #5 500K tank
MW-3
MW-4
MW-5
120.0
100.0
80.0
60.0
40.0
20.0
0.0
mg/L
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18
Sampling Date

M E M O R A N D U M

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Site Visit, Rōnile, Inc., VPDES Permit No. VA0076015

TO: Kip Foster

FROM: Lewis Pillis

DATE: July 3, 2018

COPIES: file

I visited the subject facility on Monday, July 2nd. Wade Thompson, Environmental Manager, accompanied me on a tour of the outside operations. The WWTP (AKA water plant) operates 5 days/week or less even though the manufacturing operates every day. The River at outfall 001 was viewed from the catwalk, but effluent was not visible. The aeration basin was nearly full and the curtain that separates the basin was torn and Wade stated that a quote for a replacement had been obtained and a new curtain would be replaced in future. A small amount of sludge was on a drying bed.

Outfall 004, stormwater from the paved area around the wastewater plant enters the River immediately downstream of outfall 001. Monitoring well 4 is just on the upstream side of the path to 001. The site map shows the relative locations, but not their proximity to each other.

Old equipment was being stored behind the warehouse. This area drains through outfall 003 to the vegetated utility easement.

A concrete unloading ramp for sawdust is under construction. Sawdust is used as fuel in the boiler. Previously, sawdust was used as a ramp to the unloading conveyor. Sawdust washes to a low place in the parking lot, and runs into the easement area via outfall 009. There is screening in place to catch some of the sawdust. Sawdust has passed through or around the screen and accumulated at the fence line, so that there is a spongy layer of sawdust at this point. Sawdust needs to be removed from in front of the screen and fence. It was reported that there is rip rap beyond the fence, but it could not be seen due to vegetation growing on the fence. Once the ramp is built, less sawdust will wash to the outfall.

Stormwater falling just southwest of the sawdust unloading area flows to outfall 007 via a half acre grassy area. A couple of spots could be seen where solids had settled in the grass. Concrete at the fence appeared to be breaking up and was in need of repair. Outfall 005 is in the southern corner of facility at the end of a ditch and is noted incorrectly on the site map at the upper end of the ditch.

Production at the facility was discussed and it was noted that production has gradually changed, in the past 4 to 5 years, from the use of acid dyes, which could be recycled, to acrylic or basic dyes, which cannot be recycled. There had also been an increase in the amount of chemicals used in dyeing. Wool is not being dyed currently and is not being considered. It was stated that the Technical Director researched toxicity of all chemicals prior to use, but that ecological information (i.e. aquatic toxicity) was not always available. The writer shared that some SDSs provided to DEQ contain GHS hazard

codes indicating they are chronically toxic to aquatic organisms, but that many SDSs had no information at all about ecological affects.

It was stated that there had been a large increase (10x) in the use of Pres Clear WRM over the same time period. The SDS indicates that this is stabilized sodium hydrosulfite, CAS #7775-14-6 (AKA sodium dithionite) and no ecological information is provided. It was hypothesized that this chemical along with Nicca Resist may have had the effect on the aeration basin of releasing dye and zinc from sludge.

APPENDIX B

RECEIVING WATERS INFORMATION

Flow Frequency Memo
STOReT Data

M E M O R A N D U M

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Flow Frequency Determination, Rōnile, Inc. WWTP
VPDES Permit No. VA0076015

TO: File

FROM: Lewis Pillis

DATE: April 29, 2013

COPIES:

Critical flows for the gages used in preparing the referenced permit have changed since development of the last permit. In 2011, USGS calculated low flows from the gages previously used. These gage flows were used to find resulting critical flows at the Ronile facility and then averaged. The two gages used previously are:

Blackwater River gage # 02056900 at Rocky Mount
Pigg River gage # 02058400 near Sandy Level

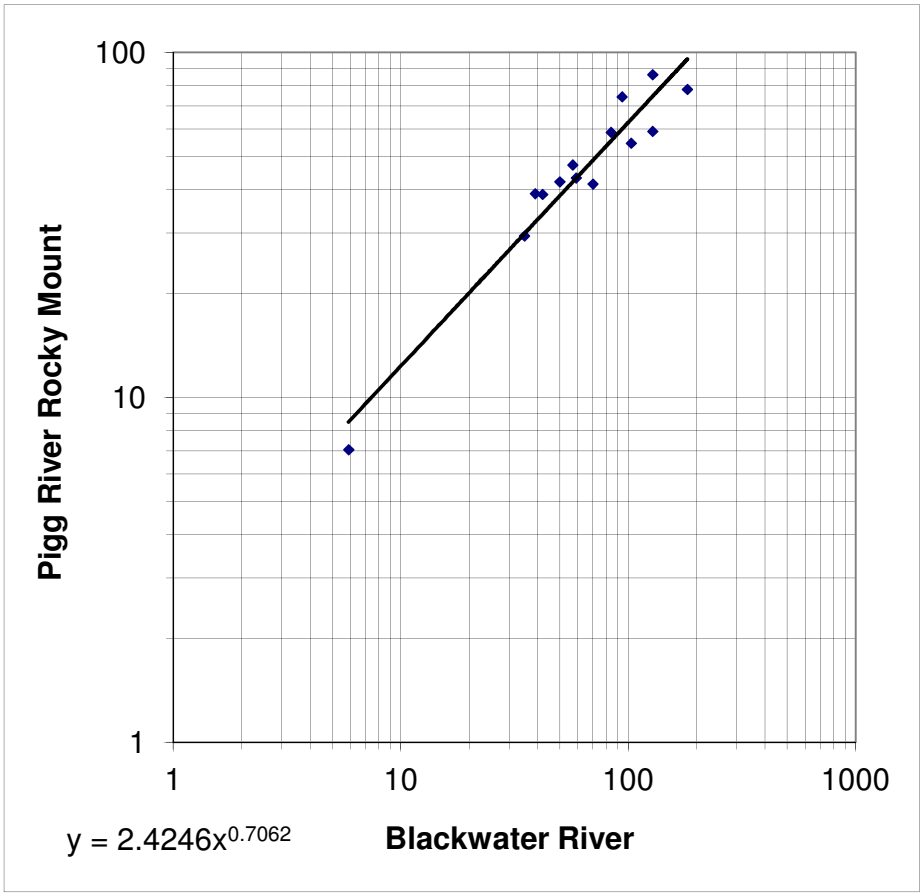
The Surface Water Investigations Office in Charlottesville performed 14 site specific flow measurements on the Pigg River, near Ronile at Latitude 36 59'02", Longitude 79 52'52", NAD 83, between 1993 and 2005. Mean daily flows, on the same days, at the gages above were found in the USGS web-interface. The same correlation, using standard Agency regression analysis in 2008 was maintained and new critical flows determined at Ronile were calculated by inserting each gage's critical flows into the relationship [regression equation] and then averaged. Regression curves are shown on the following pages.

Critical flows at the Ronile outfall 001 on the Pigg River are determined to be:

	cfs in 2008;	cfs in 2011	MGD in 2008;	MGD in 2011
1Q10	8.96	9.42	5.79	6.1
7Q10	10.0	10.5	6.49	6.8
30Q5	18.1	18.4	11.7	11.9
30Q10	14.2	14.8	9.2	9.5
HF 1Q10	25.2	*	16.3	*
HF 7Q10	28.1	*	18.1	*
Harmonic Mean	41.9	*	27.1	*

High flow months are Jan – May
* Flow not recalculated by USGS

Pigg River above Ronile STP, at Rocky Mount, VA #02057650
vs Blackwater River near Rocky Mount, VA #02056900



Flow Data (cfs)

Date	Blackwatr	Pigg RM
9/1/1993	39	39
6/22/1994	57	47.2
11/9/1994	50	42.2
11/19/1996	128	86.3
5/22/1997	94	74.4
6/24/1997	84	58.7
9/17/1997	35	29.4
8/17/1999	5.9	7.06
7/8/2004	70	41.6
7/29/2004	59	43.3
8/26/2004	42	38.8
9/21/2004	128	59.1
11/1/2004	103	54.6
12/8/2004	182	78.2

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.985115
R Square	0.970452
Adjusted R Square	0.965527
Standard Error	4.66325
Observations	14

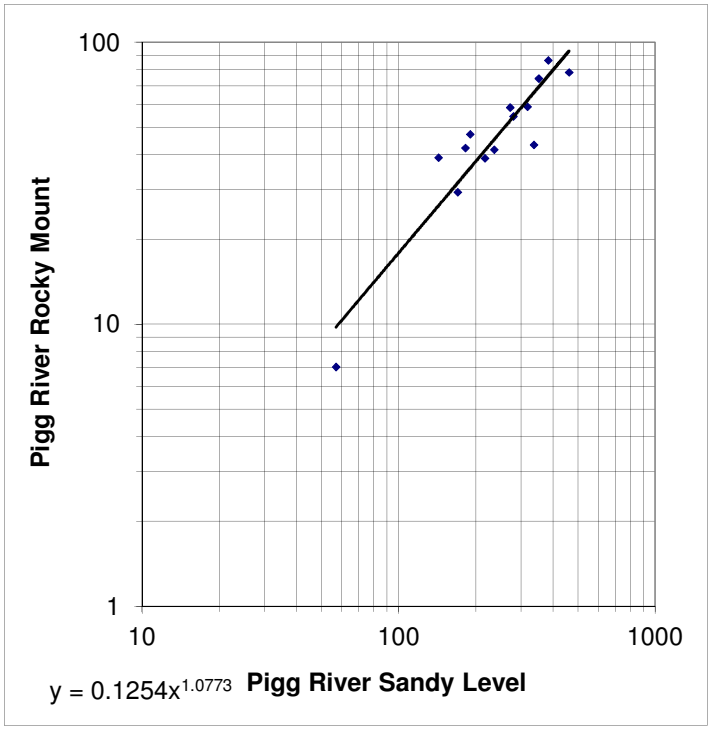
Flow Frequencies (cfs)

Blackwatr		Pigg RM
8.4	1Q10	10.898
9.8	7Q10	12.152
22	30Q5	21.511
32	HF 1Q10	28.027
38	HF 7Q10	31.643
61	HM	44.202
16	30Q10	17.179
115 mi2	DA	68.8 mi2
	Jan-May	
85	4/25/2008	55.872

2011 USGS flow frequencies (cfs)

Blackwatr		Pigg RM
8.84	1Q10	11.299
10.3	7Q10	12.587
22.1	30Q5	21.580
32	HF 1Q10	28.027
38	HF 7Q10	31.643
61	HM	44.202
17	30Q10	17.930
115 mi2	DA	68.8 mi2
	Jan-May	

Pigg River above Ronile STP, at Rocky Mount, VA #02057650
vs Pigg River near Sandy Level, VA #02058400



Flow Data (cfs)

Date	Pigg SL	Pigg RM
9/1/1993	143	39
6/22/1994	190	47.2
11/9/1994	182	42.2
11/19/1996	383	86.3
5/22/1997	352	74.4
6/24/1997	272	58.7
9/17/1997	170	29.4
8/17/1999	57	7.06
7/8/2004	236	41.6
7/29/2004	337	43.3
8/26/2004	217	38.8
9/21/2004	318	59.1
11/1/2004	280	54.6
12/8/2004	462	78.2

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.977322
R Square	0.955159
Adjusted R Square	0.947686
Standard Error	5.744595
Observations	8

Flow Frequencies (cfs)

Pigg SL		Pigg RM
42	1Q10	7.031
47	7Q10	7.937
83	30Q5	14.646
123	HF 1Q10	22.374
134	HF 7Q10	24.537
209	HM	39.609
65	30Q10	11.255
350 mi2	DA	68.8 mi2
	Jan-May	
353	4/25/2008	69.665
	date cross section was measured	

2008 FLOWS:

Blackwater

Pigg RM	Ave, cfs	Ave, MGD
10.898	8.964798	5.79
12.152	10.04438	6.49
21.511	18.07848	11.68
28.027	25.20074	16.29
31.643	28.09038	18.15
44.202	41.90528	27.08
17.179	14.21688	9.19

River/Diffuser measurements made on 4/25/8 by Roger McBride of Ronile:

flow at Pigg River gage was 353 cfs on 4/25/8
flow at Blackwater River gage was 85 cfs on 4/25/8

Average of calculated flows at Ronile = (86.659+64.559)/2
75.609 cfs
48.8661 MGD

2011 USGS Flow Frequencies (cfs)

Pigg SL		Pigg RM
44.8	1Q10	7.537
49.9	7Q10	8.466
86.4	30Q5	15.293
123	HF 1Q10	22.374
134	HF 7Q10	24.537
209	HM	39.609
66.7	30Q10	11.573
350 mi2	DA	68.8 mi2
	Jan-May	

Blackwater/

Pigg RM	Ave, cfs	Ave, MGD	% change
11.2986	9.417981	6.09	5.06%
12.58652	10.5261	6.80	4.80%
21.57992	18.43666	11.92	1.98%
28.02703	25.20074	16.29	0.00%
31.64341	28.09038	18.15	0.00%
44.20181	41.90528	27.08	0.00%
17.93012	14.75132	9.53	3.76%

2011 USGS gage flows shown in italics

Pigg River Data Upstream of Ronile

Station ID 4APGG057.85

Collection Date Time	Temp Celcius	Field pH		Date	Temp C	Date	Field pH
02/27/2007 11:30	6.1	7.4	1	08/14/2007 1	23.5	04/05/2007 1	7.5
04/05/2007 12:00	12.5	7.5	2	08/07/2008 1	22.7	02/27/2007 1	7.4
06/05/2007 12:00	19.2	5.9	3	06/02/2008 1	21.6	02/05/2008 1	7.2
08/14/2007 14:00	23.5	6.1	4	06/05/2007 1	19.2	10/09/2008 1	7.2
10/02/2007 12:00	15.2	6.1	5	10/09/2008 1	16.8	08/07/2008 1	7.1
12/05/2007 12:00	3.4	6.6	6	10/02/2007 1	15.2	12/16/2008 1	7
02/05/2008 12:00	9.3	7.2	7	04/05/2007 1	12.5	12/05/2007 1	6.6
04/07/2008 12:30	10.4	6.6	8	04/07/2008 1	10.4	04/07/2008 1	6.6
06/02/2008 12:30	21.6	6.5	9	02/05/2008 1	9.3	06/02/2008 1	6.5
08/07/2008 13:00	22.7	7.1	10	12/16/2008 1	8.1	08/14/2007 1	6.1
10/09/2008 14:00	16.8	7.2	11	02/27/2007 1	6.1	10/02/2007 1	6.1
12/16/2008 11:00	8.1	7	12	12/05/2007 1	3.4	06/05/2007 1	5.9

PIGG RIVER DATA
Station 4APGG057.84 upstream of Ronile

Collection_Date_Time = 2002-06-25 12:15:00.0

	Value	
ALUMINUM AL,DISS UG/L	10.6	--
ANTIMONY SB,DISS UG/L	0.1	Material Analyzed for, but not detected. Value stored is the limit of detection.
ARSENIC AS,DISS UG/L	0.28	--
BARIUM BA,DISS UG/L	19	--
BERYLIUM BE,DISS UG/L	0.1	Material Analyzed for, but not detected. Value stored is the limit of detection.
CADMIUM CD,DISS UG/L	0.1	Material Analyzed for, but not detected. Value stored is the limit of detection.
CALCIUM CA,DISS MG/L	9.2	--
CHROMIUM CR,DISS UG/L	0.12	--
COPPER CU,DISS UG/L	0.68	--
IRON FE,DISS UG/L	144	--
LEAD PB,DISS UG/L	0.1	Material Analyzed for, but not detected. Value stored is the limit of detection.
MANGNESE MN,DISS UG/L	28	--
MGNSIUM MG,DISS MG/L	4.8	--
NICKEL NI,DISS UG/L	0.38	--
SELENIUM SE,DISS UG/L	0.5	Material Analyzed for, but not detected. Value stored is the limit of detection.
SILVER AG,DISS UG/L	0.1	Material Analyzed for, but not detected. Value stored is the limit of detection.
THALLIUM TL,DISS UG/L	0.2	Material Analyzed for, but not detected. Value stored is the limit of detection.
ZINC ZN,DISS UG/L	2.55	--

STORET Stream data
Station 4APGG068.49

Date Time	Depth	Temp Celsius	Field Ph	Parm Name	Value
7/26/2001	0.3	26.1	7.7	HARDNESS, TOTAL (MG/L AS CACO3)	30.9
9/4/2001	0.3	21	8	HARDNESS, TOTAL (MG/L AS CACO3)	23.4
11/29/2001	0.3	11.7	8	HARDNESS, TOTAL (MG/L AS CACO3)	27.7
1/10/2002	0.3	7	7.4	HARDNESS, TOTAL (MG/L AS CACO3)	17.5
3/14/2002	0.3	8.3	7.1	HARDNESS, TOTAL (MG/L AS CACO3)	23.9
5/15/2002	0.3	17.5	7.93	HARDNESS, TOTAL (MG/L AS CACO3)	31
7/16/2002	0.3	21.6	7.9	HARDNESS, TOTAL (MG/L AS CACO3)	38.3
9/19/2002	0.3	20.5	8.03	HARDNESS, TOTAL (MG/L AS CACO3)	36.7
11/18/2002	0.3	8.6	7.51	HARDNESS, TOTAL (MG/L AS CACO3)	34.5
2/3/2003	0.3	4.7	7.8	HARDNESS, TOTAL (MG/L AS CACO3)	29.1
3/11/2003	0.3	5.6	7.8	HARDNESS, TOTAL (MG/L AS CACO3)	33.2
5/27/2003	0.3	14.8	7.42	HARDNESS, TOTAL (MG/L AS CACO3)	31.9

APPENDIX C

PERMIT LIMIT DEVELOPMENT

Waste Load Allocation Spreadsheet
STATS printouts

Ronile Inc. VA0076015

Federal Effluent Guidelines - 40 CFR Part 410, Subpart G, NSPS

Parameter	Effluent Guidelines Average (kg/Kkg)	Effluent Guidelines Maximum (kg/Kkg)	Effluent Limit Average (kg/day)	Effluent Limit' Maximum (kg/day)	Equivalent concentration at max 30 day ave flow & average loading limit (mg/L)	Equivalent concentration at max 30 day ave flow & maximum loading limit (mg/L)
BOD_5	1.9	3.6	19.38	36.72		
COD	21.9	33.9	223.38	345.78		
TSS	4.4	9.8	44.88	99.96		
Sulfide	0.12	0.24	1.22	2.45	2.0	4.1
Phenols	0.06	0.12	0.61	1.22	1.0	2.0
Total Chromium	0.06	0.12	0.61	1.22	1.0	2.0
pH	6.0 - 9.0 at all times					

Notes:
Production rate from 2017 form 2C
Average Daily Production (kkg) = 10.2

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: CORMIX Model Results, Ronile, Inc., Rocky Mount, Franklin County
VPDES Permit Number: VA0076015

TO: Kip Foster

FROM: Lewis Pillis

DATE: June 9, 2008

COPIES: file

Ronile recently replaced their diffuser with a different arrangement. CORMIX modeling was used to determine whether estimated dilution using the new port arrangement will change. The Technical Support Document for Water Quality-based Toxics Control, EPA/505/2-90-001, March 1991, [TSD] is currently used by DEQ to evaluate mixing zones. Decision criteria from page 72 of the TSD are used to determine dilution in the zone of initial dilution [ZID], or acute mixing zone. In this case, the critical dimension to prevent acute affects to aquatic organisms, is 10% of the regulatory mixing zone in any direction, which calculates to 0.53 meters.

Ronile measured the diffuser and river depth on April 25, 2008. The River measured 39.3 ft wide with a maximum depth of 4.6 ft. Gage flows on this date were obtained. Using the same regression analysis as in flow frequency determination, the flow of the Pigg River at the outfall on that day was determined to be 75.61 cfs [48.9 MGD]. According to the USGS web site this is about average flow for April 25th. Based on these measurement, the cross sectional area of the river at the diffuser is estimated to be 105 ft^2. The River bottom has an obtuse parabolic shape.

Since the diffuser at Ronile has two different sized ports, the average diffuser port effective diameter was determined by dividing the total diffuser port area by the number of ports and assuming a circular port shape. There are two 6 in^2 ports and three 18 in^2 ports for a total of 66 in^2, or an average port area of 13.2 in^2. The diameter of a 13.2 in^2 port would be 4.1 inches. This is used as the effective diameter [0.1041 meters].

Results from CORMIX runs at acute conditions, show that dilution at 0.53 meters downstream varies depending on the river width and depth used. An acute dilution of 7.0 resulted when the following inputs were used:

1Q10 = 5.8 MGD [0.223 m^3/s]
river width = 35 ft [10.67 m]
local river depth = 3 ft [0.914 m]
average river depth = 2.7 ft [0.823 m]
height of diffuser off bottom = .2m
river temp = 25C, effluent temp = 25.6C

Separate model runs at 7Q10 were used to estimate dilution under chronic conditions. Under chronic conditions, the critical factor is the maximum width of the plume which should not exceed half of the River's width. Dilution is evaluated when the "half-width" of the CORMIX plume is equal to 35/2 or 17.5 feet (5.33 meters). Dilution of 19.5:1 occurs when the 7Q10 = 6.5 MGD and the river dimensions are the same as above.

An attempt was made to calculate critical River dimensions using flow frequency and the measured River dimensions and known gage flow. Although, the calculated cross sectional area compares favorably with area calculated using the V-shape formula in ESC handbook p. V-133 of 91.87 ft^2 , width or depth at low flows still cannot be estimated mathematically. Output from the CORMIX model depended more on River width and depth, than other model variables.

CORMIX -- CORNELL MIXING ZONE EXPERT SYSTEM -- Version 3.00-3.20

SITE Name: Ronile Date:
Design CASE: Prepared by:
DOS FILE NAME: _____ (w/o extension)

AMBIENT DATA:

Water body depth: .87-1.0 m Water body is: bounded/unbounded
Depth at discharge: same m If bounded: Width: 7.6-9.1 m
If steady: Ambient flowrate: .2541 m^3/s or: Appearance: 1/2/3
1Q10 Ambient velocity: _____ m/s

If tidal: Tidal period: _____ hr Max. tidal velocity: _____ m/s
At time _____ hr before/at/after slack: Tidal velocity at this time: _____ m/s

Manning's n: .035-0.045 .04 or: Darcy-Weisbach f: _____
Wind speed: _____ m/s

Density data:

UNITS: Density...kg/m^3 / Temperature...°C
Water body is: fresh/salt water If fresh: Specify as density/temp. values
If uniform: Average density/temp. 25

If stratified: Density/temp. at surface: _____
Stratification type: A/B/C Density/temp. at bottom: _____
If B/C: Pycnocline height: _____ m If C: Density/temp. jump: _____

DISCHARGE DATA:

Specify **geometry** for CORMIX1 or 2 or 3

SUBMERGED SINGLE PORT DISCHARGE -- CORMIX1

Nearest bank is on: left/right Distance to nearest bank: 3.317 m
Vertical angle THETA: _____ ° Horizontal angle SIGMA: _____ °
Port diameter effective: .1041 m or: Port area: _____ m^2
Port height: .2 m

SUBMERGED MULTIPORT DIFFUSER DISCHARGE -- CORMIX2

Nearest bank is on: left/right Distance to one endpoint: 3.317 m
Diffuser length: 1.5621 m to other endpoint: 4.879 m
Total number of openings: 5 m Port height: 0.2 m
Port diameter: .1041 m with contraction ratio: 1.0
Diffuser arrangement/type: unidirectional / staged / alternating or vertical
Alignment angle GAMMA: 90 ° Horizontal angle SIGMA: 0 °
Vertical angle THETA: 0 ° Relative orientation BETA: 90 °

BUOYANT SURFACE DISCHARGE -- CORMIX3

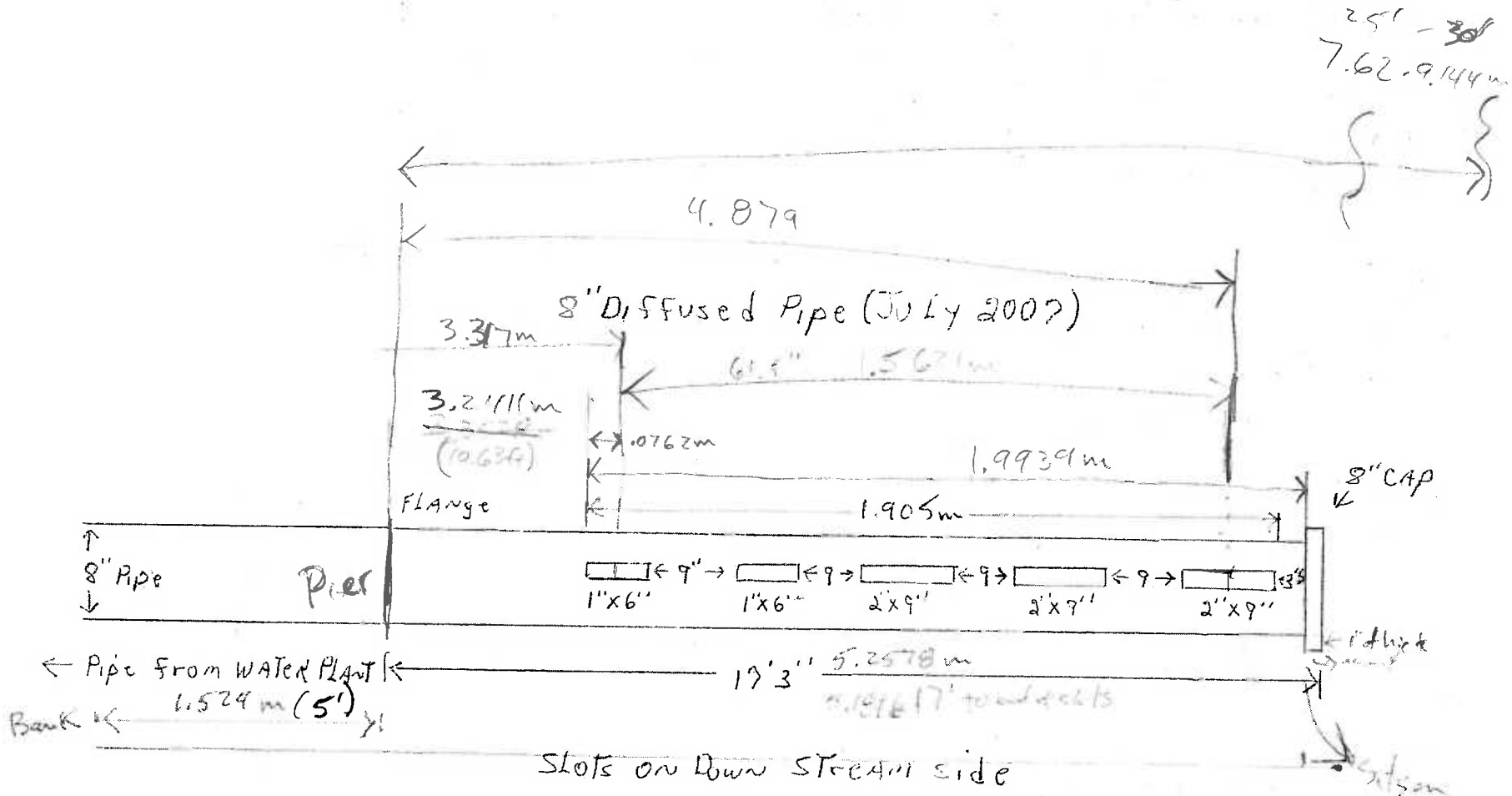
Discharge located on: left/right bank Configuration: flush/protruding/co-flowing
Horizontal angle SIGMA: _____ ° If protruding: Dist. from bank: _____ m
Depth at discharge: _____ m Bottom slope: _____ °
If rectangular discharge channel: Width: _____ m or: If circular pipe: Diameter: _____ m
Depth: _____ m Bottom invert depth: _____ m

Effluent: Flow rate: 0.006578 m^3/s or: Effluent velocity: _____ m/s
Effluent density: _____ kg/m^3 or: Effluent temperature: 25.6 °C
Heated discharge? yes/no If yes: Heat loss coefficient: _____ $W/m^2,°C$
Concentration units: _____ Effluent concentration: _____
Conservative substance? yes/no If no: Decay coefficient: _____ /day

MIXING ZONE DATA:

Is effluent toxic? yes/no If yes: CMC _____ CCC _____
WQ stand./conventional poll.? yes/no If yes: value of standard _____
Any mixing zone specified? yes/no If yes: distance _____ m or width _____ % or m
or area _____ % or m^2

Region of interest: _____ m Grid intervals for display: _____

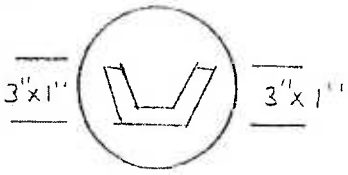


Total diffuser area:

6 in²
6 in²
18 in²
18 in²
18 in²

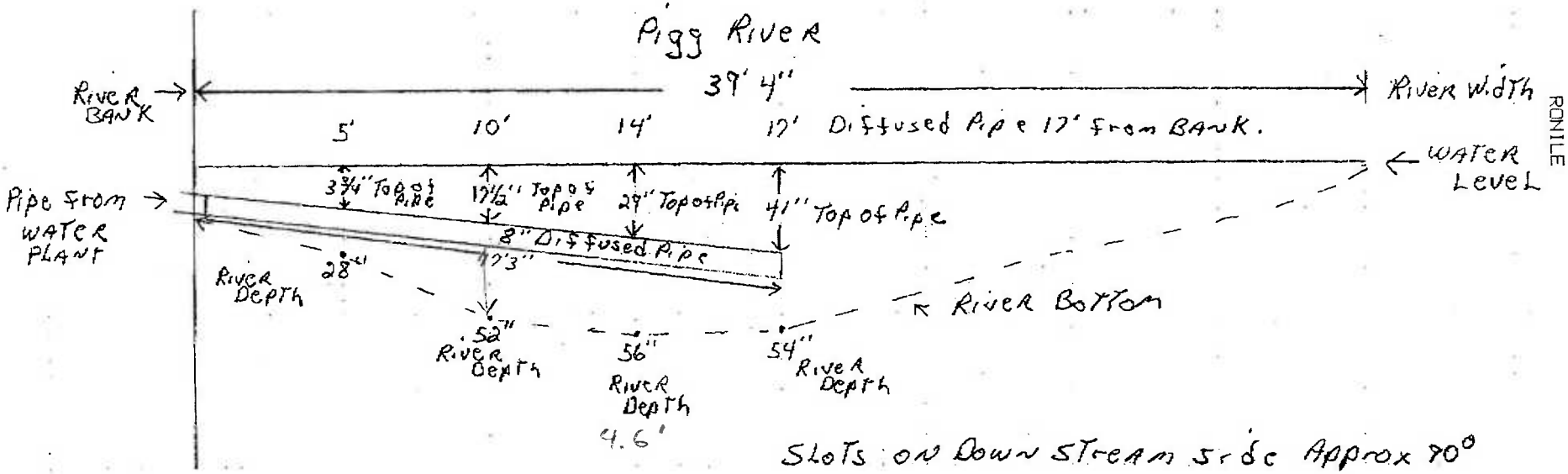
66 in² = .04258m²

Pipe CAP



RSMc
2-19-07

Ronile Inc.



Height above bottom

ave depth

5½" − (17½ + 8) = 26"

56 − 29 18) = 19"

54 − (41 +) = 5"

ave 16.8" (0.42672 m)

Ronile Inc
5-1-08
Roger McBride
Measured 4/25/08

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX2:                                          Subsystem version:
 Submerged Multiport Diffuser Discharges    CORMIX_v.3.20_____September_1996
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:          Ronile
 Design case:              revised_1Q10_5.8_MGD
 FILE NAME:                cormix\sim\RONILE22.cx2
 Time of Fortran run:      06/09/08--13:32:28

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     10.67  AS    =      8.75  QA    =       .25  ICHREG= 1
 HA    =       .82  HD    =       .91
 UA    =       .029 F     =       .134 USTAR = .3760E-02
 UW    =      2.000 UWSTAR= .2198E-02
 Uniform density environment
 STRCND=  U         RHOAM =  997.0455

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= unidirectional_perpendicular
 BANK  =  LEFT      DISTB =      4.10  YB1   =      3.32  YB2   =      4.88
 LD    =      1.56  NOPEN =    5       SPAC  =       .39
 D0    =       .104 A0    =       .009 H0    =       .20
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =     90.00  THETA =       .00  SIGMA =       .00  BETA  =     90.00
 U0    =       .153 Q0    =       .007       = .6528E-02
 RHO0  =  996.8900  DRHO0 = .1555E+00  GP0   = .1529E-02
 C0    = .1000E+03  CUNITS=  %
 IPOLL =  1         KS    = .0000E+00  KD    = .0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    = .4179E-02  m0    = .6410E-03  j0    = .6390E-05  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =       .027 lM    =      1.86  lm    =       .76
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    = .6528E-02  M0    = .1001E-02  J0    = .9981E-05
 Associated 3-d length scales (meters)
 LQ    =       .21  LM    =      1.78  Lm    =      1.09  Lb    =       .41
                                        Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     23.75  FRD0  =     12.15  R     =      5.28
 (slot)             (port/nozzle)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU2    2
 2  Applicable layer depth HS =      .91  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    = .1000E+03  CUNITS=  %
 NTOX  =  0
 NSTD  =  0
 REGMZ =  0
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
         4.10 m  from the LEFT  bank/shore.
```

X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 50 display intervals per module

BEGIN MOD201: DIFFUSER DISCHARGE MODULE

Due to complex near-field motions: EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

Profile definitions:
BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
BH = top-hat half-width, in horizontal plane normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
.00	.00	.20	1.0	.100E+03	.02	.78

END OF MOD201: DIFFUSER DISCHARGE MODULE

BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY MIXED over the entire layer depth (HS = .91m).
Full mixing is achieved after a plume distance of about five layer depths from the diffuser.

Profile definitions:
BV = layer depth (vertically mixed)
BH = top-hat half-width, in horizontal plane normal to trajectory
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
.00	.00	.20	1.0	.100E+03	.02	.78
.02	.00	.21	2.0	.491E+02	.02	.77
.03	.00	.21	2.5	.406E+02	.04	.76
.05	.00	.22	2.8	.358E+02	.05	.76
.06	.00	.22	3.1	.325E+02	.07	.75
.08	.00	.23	3.3	.301E+02	.09	.74
.09	.00	.23	3.5	.283E+02	.11	.74
.11	.00	.24	3.7	.267E+02	.13	.73
.12	.00	.24	3.9	.254E+02	.15	.72
.14	.00	.25	4.1	.243E+02	.16	.72
.16	.00	.25	4.3	.234E+02	.18	.71
.17	.00	.26	4.4	.225E+02	.20	.71
.19	.00	.26	4.6	.218E+02	.22	.70
.20	.00	.27	4.7	.211E+02	.24	.70
.22	.00	.27	4.9	.205E+02	.25	.69
.23	.00	.28	5.0	.199E+02	.27	.69
.25	.00	.28	5.1	.194E+02	.29	.69
.27	.00	.29	5.3	.190E+02	.31	.68
.28	.00	.29	5.4	.185E+02	.33	.68
.30	.00	.30	5.5	.181E+02	.35	.68
.31	.00	.30	5.6	.177E+02	.36	.67
.33	.00	.31	5.8	.174E+02	.38	.67
.34	.00	.31	5.9	.171E+02	.40	.67
.36	.00	.32	6.0	.167E+02	.42	.66
.37	.00	.32	6.1	.165E+02	.44	.66
.39	.00	.33	6.2	.162E+02	.46	.66
.41	.00	.33	6.3	.159E+02	.47	.66
.42	.00	.34	6.4	.157E+02	.49	.65
.44	.00	.34	6.5	.154E+02	.51	.65
.45	.00	.35	6.6	.152E+02	.53	.65
.47	.00	.35	6.7	.150E+02	.55	.65
.48	.00	.36	6.8	.148E+02	.56	.64

.50	.00	.36	6.9	.146E+02	.58	.64
.52	.00	.37	7.0	.144E+02	.60	.64
—> .53	.00	.37	7.0	.142E+02	.62	.64
.55	.00	.38	7.1	.140E+02	.64	.64
.56	.00	.38	7.2	.139E+02	.66	.64
.58	.00	.39	7.3	.137E+02	.67	.64
.59	.00	.39	7.4	.135E+02	.69	.64
.61	.00	.40	7.5	.134E+02	.71	.63
.62	.00	.40	7.6	.132E+02	.73	.63
.64	.00	.41	7.6	.131E+02	.75	.63
.66	.00	.41	7.7	.130E+02	.76	.63
.67	.00	.42	7.8	.128E+02	.78	.63
.69	.00	.42	7.9	.127E+02	.80	.63
.70	.00	.43	8.0	.126E+02	.82	.63
.72	.00	.43	8.0	.125E+02	.84	.63
.73	.00	.44	8.1	.123E+02	.86	.63
.75	.00	.44	8.2	.122E+02	.87	.63
.77	.00	.45	8.3	.121E+02	.89	.63
.78	.00	.46	8.3	.120E+02	.91	.63

Cumulative travel time = 16. sec

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW

** End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be
CORRECTED by a factor 1.59 to conserve the mass flux in the far-field!
The correction factor is quite large because of the small ambient velocity
relative to the strong mixing characteristics of the discharge!
This indicates localized RECIRCULATION REGIONS and internal hydraulic JUMPS.

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
.78	.00	.91	8.3	.120E+02	.91	1.00	.91	.00
1.10	.00	.91	8.5	.117E+02	.85	1.10	.91	.06
1.42	.00	.91	8.7	.115E+02	.80	1.19	.91	.11
1.73	.00	.91	8.9	.113E+02	.76	1.28	.91	.15
2.05	.00	.91	9.0	.111E+02	.73	1.36	.91	.18
2.37	.00	.91	9.2	.109E+02	.70	1.44	.91	.21
2.68	.00	.91	9.3	.107E+02	.67	1.52	.91	.24
3.00	.00	.91	9.5	.106E+02	.65	1.60	.91	.26
3.32	.00	.91	9.6	.104E+02	.63	1.68	.91	.28
3.64	.00	.91	9.7	.103E+02	.61	1.75	.91	.30
3.95	.00	.91	9.9	.101E+02	.59	1.83	.91	.32

4.27	.00	.91	10.0	.100E+02	.58	1.90	.91	.33
4.59	.00	.91	10.1	.989E+01	.56	1.97	.91	.35
4.91	.00	.91	10.2	.977E+01	.55	2.04	.91	.36
5.22	.00	.91	10.4	.966E+01	.54	2.10	.91	.37
5.54	.00	.91	10.5	.955E+01	.53	2.17	.91	.38
5.86	.00	.91	10.6	.944E+01	.52	2.24	.91	.39
6.17	.00	.91	10.7	.933E+01	.51	2.30	.91	.40
6.49	.00	.91	10.8	.923E+01	.50	2.36	.91	.41
6.81	.00	.91	11.0	.913E+01	.49	2.43	.91	.42
7.13	.00	.91	11.1	.903E+01	.49	2.49	.91	.42
7.44	.00	.91	11.2	.893E+01	.48	2.55	.91	.43
7.76	.00	.91	11.3	.883E+01	.48	2.61	.91	.43
8.08	.00	.91	11.4	.874E+01	.47	2.67	.91	.44
8.39	.00	.91	11.6	.864E+01	.46	2.73	.91	.45
8.71	.00	.91	11.7	.855E+01	.46	2.79	.91	.45
9.03	.00	.91	11.8	.846E+01	.46	2.85	.91	.45
9.35	.00	.91	12.0	.836E+01	.45	2.90	.91	.46
9.66	.00	.91	12.1	.827E+01	.45	2.96	.91	.46
9.98	.00	.91	12.2	.818E+01	.44	3.02	.91	.47
10.30	.00	.91	12.4	.809E+01	.44	3.07	.91	.47
10.62	.00	.91	12.5	.800E+01	.44	3.13	.91	.47
10.93	.00	.91	12.6	.792E+01	.43	3.18	.91	.48
11.25	.00	.91	12.8	.783E+01	.43	3.24	.91	.48
11.57	.00	.91	12.9	.774E+01	.43	3.29	.91	.48
11.88	.00	.91	13.1	.765E+01	.43	3.34	.91	.48
12.20	.00	.91	13.2	.757E+01	.43	3.40	.91	.48
12.52	.00	.91	13.4	.748E+01	.42	3.45	.91	.49
12.84	.00	.91	13.5	.740E+01	.42	3.50	.91	.49
13.15	.00	.91	13.7	.731E+01	.42	3.55	.91	.49
13.47	.00	.91	13.8	.723E+01	.42	3.60	.91	.49
13.79	.00	.91	14.0	.715E+01	.42	3.66	.91	.49
14.10	.00	.91	14.2	.706E+01	.42	3.71	.91	.49
14.42	.00	.91	14.3	.698E+01	.42	3.76	.91	.49
14.74	.00	.91	14.5	.690E+01	.42	3.81	.91	.49
15.06	.00	.91	14.7	.682E+01	.42	3.86	.91	.49
15.37	.00	.91	14.8	.674E+01	.42	3.91	.91	.49
15.69	.00	.91	15.0	.666E+01	.42	3.95	.91	.49
16.01	.00	.91	15.2	.658E+01	.42	4.00	.91	.49
16.33	.00	.91	15.4	.650E+01	.42	4.05	.91	.49
16.64	.00	.91	15.6	.642E+01	.42	4.10	.91	.49

Cumulative travel time = 549. sec

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
16.64	4.10	.91	15.6	.642E+01	.42	8.20	.91	.49
16.99	4.10	.91	15.8	.635E+01	.42	8.25	.91	.49
17.35	4.10	.91	15.9	.627E+01	.42	8.30	.91	.49
17.70	4.10	.91	16.1	.620E+01	.42	8.35	.91	.49
18.05	4.10	.91	16.3	.613E+01	.43	8.41	.91	.48
18.40	4.10	.91	16.5	.605E+01	.43	8.46	.91	.48
18.75	4.10	.91	16.7	.598E+01	.43	8.51	.91	.48
19.11	4.10	.91	16.9	.591E+01	.43	8.56	.91	.48
19.46	4.10	.91	17.1	.584E+01	.44	8.62	.91	.47
19.81	4.10	.91	17.3	.577E+01	.44	8.67	.91	.47
20.16	4.10	.91	17.5	.571E+01	.44	8.72	.91	.47
20.51	4.10	.91	17.7	.564E+01	.44	8.77	.91	.47
20.87	4.10	.91	17.9	.557E+01	.45	8.82	.91	.46
21.22	4.10	.91	18.1	.551E+01	.45	8.87	.91	.46
21.57	4.10	.91	18.4	.545E+01	.45	8.92	.91	.46
21.92	4.10	.91	18.6	.538E+01	.45	8.97	.91	.46
22.28	4.10	.91	18.8	.532E+01	.46	9.02	.91	.45
22.63	4.10	.91	19.0	.526E+01	.46	9.08	.91	.45

22.98	4.10	.91	19.2	.520E+01	.46	9.13	.91	.45
23.33	4.10	.91	19.5	.514E+01	.46	9.18	.91	.45
23.68	4.10	.91	19.7	.508E+01	.47	9.23	.91	.44
24.04	4.10	.91	19.9	.502E+01	.47	9.28	.91	.44
24.39	4.10	.91	20.2	.496E+01	.47	9.33	.91	.44
24.74	4.10	.91	20.4	.491E+01	.48	9.38	.91	.43
25.09	4.10	.91	20.6	.485E+01	.48	9.42	.91	.43
25.44	4.10	.91	20.9	.479E+01	.48	9.47	.91	.43
25.80	4.10	.91	21.1	.474E+01	.49	9.52	.91	.42
26.15	4.10	.91	21.3	.468E+01	.49	9.57	.91	.42
26.50	4.10	.91	21.6	.463E+01	.49	9.62	.91	.42
26.85	4.10	.91	21.8	.458E+01	.49	9.67	.91	.42
27.20	4.10	.91	22.1	.453E+01	.50	9.72	.91	.41
27.56	4.10	.91	22.3	.448E+01	.50	9.77	.91	.41
27.91	4.10	.91	22.6	.443E+01	.50	9.82	.91	.41
28.26	4.10	.91	22.9	.438E+01	.51	9.87	.91	.40
28.61	4.10	.91	23.1	.433E+01	.51	9.91	.91	.40
28.96	4.10	.91	23.4	.428E+01	.51	9.96	.91	.40
29.32	4.10	.91	23.6	.423E+01	.52	10.01	.91	.39
29.67	4.10	.91	23.9	.418E+01	.52	10.06	.91	.39
30.02	4.10	.91	24.2	.414E+01	.52	10.11	.91	.39
30.37	4.10	.91	24.4	.409E+01	.53	10.15	.91	.38
30.72	4.10	.91	24.7	.405E+01	.53	10.20	.91	.38
31.08	4.10	.91	25.0	.400E+01	.53	10.25	.91	.38
31.43	4.10	.91	25.3	.396E+01	.54	10.30	.91	.37
31.78	4.10	.91	25.6	.391E+01	.54	10.34	.91	.37
32.13	4.10	.91	25.8	.387E+01	.54	10.39	.91	.37
32.48	4.10	.91	26.1	.383E+01	.55	10.44	.91	.36
32.84	4.10	.91	26.4	.379E+01	.55	10.48	.91	.36
33.19	4.10	.91	26.7	.374E+01	.56	10.53	.91	.35
33.54	4.10	.91	27.0	.370E+01	.56	10.58	.91	.35
33.89	4.10	.91	27.3	.366E+01	.56	10.62	.91	.35
34.24	4.10	.91	27.6	.362E+01	.57	10.67	.91	.34

Cumulative travel time = 1140. sec
Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING

Bottom coordinate for FAR-FIELD is determined by average depth, ZFB = .09m

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BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

Vertical diffusivity (initial value) = .728E-03 m^2/s
Horizontal diffusivity (initial value) = .909E-03 m^2/s

Profile definitions:
BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
= or equal to layer depth, if fully mixed
BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
measured horizontally in Y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
34.24	4.10	.91	27.6	.362E+01	.57	10.67	.91	.34

Plume interacts with BOTTOM.
The passive diffusion plume becomes VERTICALLY FULLY MIXED within this prediction interval.

73.56	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09

Effluent is FULLY MIXED over the entire channel cross-section.
Except for possible far-field decay or reaction processes, there are NO FURTHER CHANGES with downstream direction.

112.87	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09

152.19	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
191.50	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
230.82	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
270.13	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
309.45	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
348.76	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
388.08	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
427.39	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
466.71	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
506.03	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
545.34	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
584.66	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
623.97	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
663.29	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
702.60	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
741.92	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
781.23	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
820.55	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
859.86	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
899.18	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
938.49	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
977.81	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1017.12	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1056.44	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1095.75	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1135.07	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1174.38	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1213.70	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1253.01	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1292.33	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1331.64	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1370.96	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1410.27	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1449.59	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1488.90	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1528.22	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1567.53	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1606.85	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1646.16	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1685.48	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1724.80	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1764.11	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1803.43	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1842.74	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1882.06	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1921.37	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
1960.69	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09
2000.00	4.10	.91	39.9	.250E+01	.82	10.67	.91	.09

Cumulative travel time = 67131. sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

CORMIX2: Submerged Multiport Diffuser Discharges End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX2:                                          Subsystem version:
 Submerged Multiport Diffuser Discharges    CORMIX_v.3.20_____September_1996
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:          Ronile
 Design case:              7Q10_6.5_MGD
 FILE NAME:                cormix\sim\ronile24.cx2
 Time of Fortran run:      06/09/08--13:41:40

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     10.67  AS    =      8.75  QA    =       .28  ICHREG= 1
 HA    =       .82  HD    =       .91
 UA    =       .033 F     =       .134 USTAR = .4214E-02
 UW    =      2.000 UWSTAR= .2198E-02
 Uniform density environment
 STRCND=  U         RHOAM =  997.0455

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= unidirectional_perpendicular
 BANK  =  LEFT      DISTB =      4.10  YB1   =      3.32  YB2   =      4.88
 LD    =      1.56  NOPEN =    5       SPAC  =       .39
 D0    =       .104 A0    =       .009 H0    =       .25
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =     90.00  THETA =       .00  SIGMA =       .00  BETA  =     90.00
 U0    =       .153 Q0    =       .007       = .6528E-02
 RHO0  =  996.8900  DRHO0 = .1555E+00  GP0   = .1529E-02
 C0    = .1000E+03  CUNITS=  %
 IPOLL =  1         KS    = .0000E+00  KD    = .0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    = .4179E-02  m0    = .6410E-03  j0    = .6390E-05  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =       .027 lM    =      1.86  lm    =       .60
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    = .6528E-02  M0    = .1001E-02  J0    = .9981E-05
 Associated 3-d length scales (meters)
 LQ    =       .21  LM    =      1.78  Lm    =       .97  Lb    =       .29
                                        Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     23.75  FRD0  =     12.15  R     =      4.71
 (slot)             (port/nozzle)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU2    2
 2  Applicable layer depth HS =      .91  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    = .1000E+03  CUNITS=  %
 NTOX  =  0
 NSTD  =  0
 REGMZ =  0
 XINT  =   2000.00  XMAX  =   2000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
         4.10 m  from the LEFT  bank/shore.
```

X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 50 display intervals per module

BEGIN MOD201: DIFFUSER DISCHARGE MODULE

Due to complex near-field motions: EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

Profile definitions:
BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
BH = top-hat half-width, in horizontal plane normal to trajectory
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
.00	.00	.25	1.0	.100E+03	.02	.78

END OF MOD201: DIFFUSER DISCHARGE MODULE

BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY MIXED over the entire layer depth (HS = .91m).
Full mixing is achieved after a plume distance of about five layer depths from the diffuser.

Profile definitions:
BV = layer depth (vertically mixed)
BH = top-hat half-width, in horizontal plane normal to trajectory
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
.00	.00	.25	1.0	.100E+03	.02	.78
.02	.00	.25	2.1	.471E+02	.02	.77
.03	.00	.26	2.6	.386E+02	.04	.77
.05	.00	.26	2.9	.339E+02	.05	.76
.06	.00	.27	3.2	.308E+02	.07	.75
.08	.00	.27	3.5	.284E+02	.09	.75
.09	.00	.27	3.8	.266E+02	.11	.74
.11	.00	.28	4.0	.252E+02	.13	.73
.12	.00	.28	4.2	.239E+02	.15	.73
.14	.00	.29	4.4	.229E+02	.16	.72
.16	.00	.29	4.6	.219E+02	.18	.72
.17	.00	.30	4.7	.211E+02	.20	.72
.19	.00	.30	4.9	.204E+02	.22	.71
.20	.00	.30	5.1	.198E+02	.24	.71
.22	.00	.31	5.2	.192E+02	.25	.70
.23	.00	.31	5.4	.187E+02	.27	.70
.25	.00	.32	5.5	.182E+02	.29	.70
.27	.00	.32	5.6	.177E+02	.31	.69
.28	.00	.32	5.8	.173E+02	.33	.69
.30	.00	.33	5.9	.169E+02	.35	.69
.31	.00	.33	6.0	.166E+02	.36	.68
.33	.00	.34	6.2	.162E+02	.38	.68
.34	.00	.34	6.3	.159E+02	.40	.68
.36	.00	.34	6.4	.156E+02	.42	.68
.37	.00	.35	6.5	.154E+02	.44	.67
.39	.00	.35	6.6	.151E+02	.46	.67
.41	.00	.36	6.7	.148E+02	.47	.67
.42	.00	.36	6.8	.146E+02	.49	.67
.44	.00	.36	7.0	.144E+02	.51	.67
.45	.00	.37	7.1	.142E+02	.53	.66
.47	.00	.37	7.2	.140E+02	.55	.66
.48	.00	.38	7.3	.138E+02	.56	.66

.50	.00	.38	7.4	.136E+02	.58	.66
.52	.00	.39	7.5	.134E+02	.60	.66
.53	.00	.39	7.6	.132E+02	.62	.66
.55	.00	.39	7.7	.131E+02	.64	.65
.56	.00	.40	7.7	.129E+02	.66	.65
.58	.00	.40	7.8	.128E+02	.67	.65
.59	.00	.41	7.9	.126E+02	.69	.65
.61	.00	.41	8.0	.125E+02	.71	.65
.62	.00	.41	8.1	.123E+02	.73	.65
.64	.00	.42	8.2	.122E+02	.75	.65
.66	.00	.42	8.3	.121E+02	.76	.65
.67	.00	.43	8.4	.119E+02	.78	.65
.69	.00	.43	8.5	.118E+02	.80	.65
.70	.00	.43	8.5	.117E+02	.82	.65
.72	.00	.44	8.6	.116E+02	.84	.65
.73	.00	.44	8.7	.115E+02	.86	.65
.75	.00	.45	8.8	.114E+02	.87	.65
.77	.00	.45	8.9	.113E+02	.89	.65
.78	.00	.46	9.0	.112E+02	.91	.65

Cumulative travel time = 16. sec

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW

** End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be
CORRECTED by a factor 1.49 to conserve the mass flux in the far-field!

BEGIN MOD241: BUOYANT AMBIENT SPREADING

Profile definitions:
BV = top-hat thickness, measured vertically
BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
.78	.00	.91	9.0	.112E+02	.91	.96	.91	.00
1.16	.00	.91	9.2	.109E+02	.85	1.06	.91	.06
1.54	.00	.91	9.4	.106E+02	.80	1.16	.91	.11
1.91	.00	.91	9.6	.104E+02	.76	1.24	.91	.15
2.29	.00	.91	9.8	.102E+02	.72	1.33	.91	.19
2.67	.00	.91	10.0	.100E+02	.69	1.42	.91	.22
3.05	.00	.91	10.1	.986E+01	.66	1.50	.91	.25
3.43	.00	.91	10.3	.970E+01	.64	1.58	.91	.27
3.80	.00	.91	10.5	.955E+01	.62	1.65	.91	.29
4.18	.00	.91	10.6	.940E+01	.60	1.73	.91	.31
4.56	.00	.91	10.8	.926E+01	.59	1.80	.91	.32
4.94	.00	.91	11.0	.913E+01	.57	1.87	.91	.34
5.31	.00	.91	11.1	.900E+01	.56	1.95	.91	.35
5.69	.00	.91	11.3	.887E+01	.55	2.02	.91	.36

6.07	.00	.91	11.4	.875E+01	.54	2.08	.91	.37
6.45	.00	.91	11.6	.863E+01	.53	2.15	.91	.38
6.82	.00	.91	11.7	.851E+01	.52	2.22	.91	.39
7.20	.00	.91	11.9	.839E+01	.51	2.28	.91	.40
7.58	.00	.91	12.1	.828E+01	.50	2.35	.91	.41
7.96	.00	.91	12.2	.817E+01	.50	2.41	.91	.41
8.34	.00	.91	12.4	.806E+01	.49	2.47	.91	.42
8.71	.00	.91	12.6	.794E+01	.49	2.54	.91	.42
9.09	.00	.91	12.8	.784E+01	.48	2.60	.91	.43
9.47	.00	.91	12.9	.773E+01	.48	2.66	.91	.43
9.85	.00	.91	13.1	.762E+01	.47	2.72	.91	.44
10.22	.00	.91	13.3	.751E+01	.47	2.78	.91	.44
10.60	.00	.91	13.5	.741E+01	.47	2.83	.91	.44
10.98	.00	.91	13.7	.730E+01	.46	2.89	.91	.45
11.36	.00	.91	13.9	.720E+01	.46	2.95	.91	.45
11.74	.00	.91	14.1	.710E+01	.46	3.01	.91	.45
12.11	.00	.91	14.3	.699E+01	.46	3.06	.91	.45
12.49	.00	.91	14.5	.689E+01	.46	3.12	.91	.45
12.87	.00	.91	14.7	.679E+01	.45	3.17	.91	.46
13.25	.00	.91	14.9	.669E+01	.45	3.23	.91	.46
13.62	.00	.91	15.2	.659E+01	.45	3.28	.91	.46
14.00	.00	.91	15.4	.650E+01	.45	3.34	.91	.46
14.38	.00	.91	15.6	.640E+01	.45	3.39	.91	.46
14.76	.00	.91	15.9	.630E+01	.45	3.44	.91	.46
15.14	.00	.91	16.1	.621E+01	.45	3.50	.91	.46
15.51	.00	.91	16.4	.611E+01	.45	3.55	.91	.46
15.89	.00	.91	16.6	.602E+01	.45	3.60	.91	.46
16.27	.00	.91	16.9	.593E+01	.45	3.65	.91	.46
16.65	.00	.91	17.1	.583E+01	.45	3.70	.91	.46
17.02	.00	.91	17.4	.574E+01	.45	3.75	.91	.46
17.40	.00	.91	17.7	.565E+01	.46	3.80	.91	.45
17.78	.00	.91	18.0	.557E+01	.46	3.85	.91	.45
18.16	.00	.91	18.3	.548E+01	.46	3.90	.91	.45
18.53	.00	.91	18.5	.539E+01	.46	3.95	.91	.45
18.91	.00	.91	18.8	.531E+01	.46	4.00	.91	.45
19.29	.00	.91	19.1	.522E+01	.46	4.05	.91	.45
19.67	.00	.91 →	19.5	.514E+01	.47	4.10	.91	.44

Cumulative travel time = 583. sec

halfwidth(BH) = 5.53 in this region
S = 19.5

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
19.67	4.10	.91 →	19.5	.514E+01	.47	8.20	.91	.44
20.08	4.10	.91	19.8	.506E+01	.47	8.25	.91	.44
20.50	4.10	.91	20.1	.498E+01	.47	8.30	.91	.44
20.91	4.10	.91	20.4	.490E+01	.48	8.35	.91	.43
21.33	4.10	.91	20.7	.482E+01	.48	8.41	.91	.43
21.75	4.10	.91	21.1	.475E+01	.49	8.46	.91	.42
22.16	4.10	.91	21.4	.467E+01	.49	8.51	.91	.42
22.58	4.10	.91	21.7	.460E+01	.50	8.56	.91	.41
22.99	4.10	.91	22.1	.453E+01	.50	8.62	.91	.41
23.41	4.10	.91	22.4	.446E+01	.51	8.67	.91	.40
23.82	4.10	.91	22.8	.439E+01	.51	8.72	.91	.40
24.24	4.10	.91	23.1	.432E+01	.52	8.77	.91	.39
24.65	4.10	.91	23.5	.426E+01	.52	8.82	.91	.39
25.07	4.10	.91	23.8	.419E+01	.53	8.87	.91	.38
25.48	4.10	.91	24.2	.413E+01	.53	8.92	.91	.38
25.90	4.10	.91	24.6	.407E+01	.54	8.97	.91	.37
26.32	4.10	.91	25.0	.401E+01	.54	9.02	.91	.37
26.73	4.10	.91	25.3	.395E+01	.55	9.07	.91	.36
27.15	4.10	.91	25.7	.389E+01	.55	9.13	.91	.36
27.56	4.10	.91	26.1	.383E+01	.56	9.18	.91	.35
27.98	4.10	.91	26.5	.377E+01	.56	9.23	.91	.35

28.39	4.10	.91	26.9	.372E+01	.57	9.28	.91	.34
28.81	4.10	.91	27.3	.367E+01	.57	9.33	.91	.34
29.22	4.10	.91	27.7	.361E+01	.58	9.37	.91	.33
29.64	4.10	.91	28.1	.356E+01	.58	9.42	.91	.33
30.05	4.10	.91	28.5	.351E+01	.59	9.47	.91	.32
30.47	4.10	.91	28.9	.346E+01	.60	9.52	.91	.31
30.89	4.10	.91	29.3	.341E+01	.60	9.57	.91	.31
31.30	4.10	.91	29.8	.336E+01	.61	9.62	.91	.30
31.72	4.10	.91	30.2	.331E+01	.61	9.67	.91	.30
32.13	4.10	.91	30.6	.327E+01	.62	9.72	.91	.29
32.55	4.10	.91	31.1	.322E+01	.62	9.77	.91	.29
32.96	4.10	.91	31.5	.318E+01	.63	9.82	.91	.28
33.38	4.10	.91	31.9	.313E+01	.63	9.86	.91	.28
33.79	4.10	.91	32.4	.309E+01	.64	9.91	.91	.27
34.21	4.10	.91	32.8	.305E+01	.65	9.96	.91	.26
34.62	4.10	.91	33.3	.300E+01	.65	10.01	.91	.26
35.04	4.10	.91	33.8	.296E+01	.66	10.06	.91	.25
35.46	4.10	.91	34.2	.292E+01	.66	10.11	.91	.25
35.87	4.10	.91	34.7	.288E+01	.67	10.15	.91	.24
36.29	4.10	.91	35.2	.284E+01	.68	10.20	.91	.23
36.70	4.10	.91	35.6	.281E+01	.68	10.25	.91	.23
37.12	4.10	.91	36.1	.277E+01	.69	10.30	.91	.22
37.53	4.10	.91	36.6	.273E+01	.69	10.34	.91	.22
37.95	4.10	.91	37.1	.269E+01	.70	10.39	.91	.21
38.36	4.10	.91	37.6	.266E+01	.71	10.44	.91	.20
38.78	4.10	.91	38.1	.262E+01	.71	10.48	.91	.20
39.19	4.10	.91	38.6	.259E+01	.72	10.53	.91	.19
39.61	4.10	.91	39.1	.256E+01	.72	10.58	.91	.19
40.03	4.10	.91	39.6	.252E+01	.73	10.62	.91	.18
40.44	4.10	.91	40.1	.249E+01	.74	10.67	.91	.17

Cumulative travel time = 1207. sec
Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING

Bottom coordinate for FAR-FIELD is determined by average depth, ZFB = .09m

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BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

Vertical diffusivity (initial value) = .802E-03 m^2/s
Horizontal diffusivity (initial value) = .100E-02 m^2/s

Profile definitions:
BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
= or equal to layer depth, if fully mixed
BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
measured horizontally in Y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
40.44	4.10	.91	40.1	.249E+01	.74	10.67	.91	.17

Plume interacts with BOTTOM.
The passive diffusion plume becomes VERTICALLY FULLY MIXED within this prediction interval.

79.63	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09

Effluent is FULLY MIXED over the entire channel cross-section.
Except for possible far-field decay or reaction processes, there are NO FURTHER CHANGES with downstream direction.

118.82	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
158.01	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
197.21	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
236.40	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09

275.59	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
314.78	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
353.97	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
393.16	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
432.35	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
471.54	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
510.74	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
549.93	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
589.12	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
628.31	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
667.50	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
706.69	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
745.88	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
785.07	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
824.26	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
863.46	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
902.65	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
941.84	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
981.03	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1020.22	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1059.41	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1098.60	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1137.79	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1176.98	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1216.18	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1255.37	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1294.56	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1333.75	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1372.94	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1412.13	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1451.32	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1490.51	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1529.71	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1568.90	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1608.09	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1647.28	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1686.47	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1725.66	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1764.85	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1804.04	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1843.23	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1882.43	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1921.62	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
1960.81	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09
2000.00	4.10	.91	44.6	.224E+01	.82	10.67	.91	.09

Cumulative travel time = 60058. sec

Simulation limit based on maximum specified distance = 2000.00 m.
This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

CORMIX2: Submerged Multiport Diffuser Discharges End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Ronile Inc 001 CORMIX DILUTIONS Permit No.: VA0076015

Receiving Stream: Pigg River Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information			Stream Flows			Mixing Information			Effluent Information		
Mean Hardness (as CaCO3) =	30	mg/L	1Q10 (Annual) =	6	MGD	Annual - 1Q10 Mix =	100	%	Mean Hardness (as CaCO3) =	152	mg/L
90% Temperature (Annual) =	22.7	deg C	7Q10 (Annual) =	18.5	MGD	- 7Q10 Mix =	100	%	90% Temp (Annual) =	29	deg C
90% Temperature (Wet season) =	22.7	deg C	30Q10 (Annual) =	25	MGD	- 30Q10 Mix =	100	%	90% Temp (Wet season) =	17	deg C
90% Maximum pH =	7.4	SU	1Q10 (Wet season) =	6	MGD	Wet Season - 1Q10 Mix =	100	%	90% Maximum pH =	7.95	SU
10% Maximum pH =	6.1	SU	30Q10 (Wet season)	25	MGD	- 30Q10 Mix =	100	%	10% Maximum pH =	6.72	SU
Tier Designation (1 or 2) =	2		30Q5 =	25	MGD				Discharge Flow =	1	MGD
Public Water Supply (PWS) Y/N? =	N		Harmonic Mean =	25	MGD						
Trout Present Y/N? =	n										
Early Life Stages Present Y/N? =	y										

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations				Method
(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	Target Value
Acenapthene	0	--	--	na	9.9E+02	--	--	na	2.6E+04	--	--	na	9.9E+01	--	--	na	2.6E+03	--	--	na	2.6E+03	2.6E+03
Acrolein	0	3.0E+00	3.0E+00	na	9.3E+00	2.1E+01	5.9E+01	na	2.4E+02	7.5E-01	7.5E-01	na	9.3E-01	5.3E+00	1.5E+01	na	2.4E+01	5.3E+00	1.5E+01	na	2.4E+01	2.1E+00
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	6.5E+01	--	--	na	2.5E-01	--	--	na	6.5E+00	--	--	na	6.5E+00	6.5E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	2.1E+01	--	na	1.3E-02	7.5E-01	--	na	5.0E-05	5.3E+00	--	na	1.3E-03	5.3E+00	--	na	1.3E-03	1.3E-03
Ammonia-N (mg/l) (Yearly)	0	2.15E+01	2.72E+00	na	--	1.50E+02	7.08E+01	na	--	5.37E+00	6.81E-01	na	--	3.76E+01	1.77E+01	na	--	3.76E+01	1.77E+01	na	--	1.1E+01
Ammonia-N (mg/l) (High Flow)	0	2.15E+01	2.81E+00	na	--	1.50E+02	7.30E+01	na	--	5.37E+00	7.02E-01	na	--	3.76E+01	1.82E+01	na	--	3.76E+01	1.82E+01	na	--	1.1E+01
Anthracene	0	--	--	na	4.0E+04	--	--	na	1.0E+06	--	--	na	4.0E+03	--	--	na	1.0E+05	--	--	na	1.0E+05	1.0E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	1.7E+04	--	--	na	6.4E+01	--	--	na	1.7E+03	--	--	na	1.7E+03	1.7E+03
Arsenic	0.28	3.4E+02	1.5E+02	na	--	2.4E+03	2.9E+03	na	--	8.5E+01	3.8E+01	na	--	5.9E+02	7.3E+02	na	--	5.9E+02	7.3E+02	na	--	2.4E+02
Barium	19	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	0.0E+00
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	1.3E+04	--	--	na	5.1E+01	--	--	na	1.3E+03	--	--	na	1.3E+03	1.3E+03
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	5.2E-02	--	--	na	2.0E-04	--	--	na	5.2E-03	--	--	na	5.2E-03	5.2E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	4.7E+00	--	--	na	1.8E-02	--	--	na	4.7E-01	--	--	na	4.7E-01	4.7E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	4.7E+00	--	--	na	1.8E-02	--	--	na	4.7E-01	--	--	na	4.7E-01	4.7E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	4.7E+00	--	--	na	1.8E-02	--	--	na	4.7E-01	--	--	na	4.7E-01	4.7E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	4.7E+00	--	--	na	1.8E-02	--	--	na	4.7E-01	--	--	na	4.7E-01	4.7E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	1.4E+02	--	--	na	5.3E-01	--	--	na	1.4E+01	--	--	na	1.4E+01	1.4E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.7E+06	--	--	na	6.5E+03	--	--	na	1.7E+05	--	--	na	1.7E+05	1.7E+05
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	5.7E+02	--	--	na	2.2E+00	--	--	na	5.7E+01	--	--	na	5.7E+01	5.7E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	3.6E+04	--	--	na	1.4E+02	--	--	na	3.6E+03	--	--	na	3.6E+03	3.6E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	4.9E+04	--	--	na	1.9E+02	--	--	na	4.9E+03	--	--	na	4.9E+03	4.9E+03
Cadmium	0	1.7E+00	5.1E-01	na	--	1.2E+01	1.0E+01	na	--	4.2E-01	1.3E-01	na	--	3.0E+00	2.5E+00	na	--	3.0E+00	2.5E+00	na	--	1.2E+00
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	4.2E+02	--	--	na	1.6E+00	--	--	na	4.2E+01	--	--	na	4.2E+01	4.2E+01
Carbaryl		2.1E+00	2.1E+00	na	--	1.5E+01	4.1E+01	na	--	5.3E-01	5.3E-01	na	--	3.7E+00	1.0E+01	na	--	3.7E+00	1.0E+01	na	--	1.5E+00
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	1.7E+01	8.4E-02	na	2.1E-01	6.0E-01	1.1E-03	na	8.1E-04	4.2E+00	2.1E-02	na	2.1E-02	4.2E+00	2.1E-02	na	2.1E-02	1.3E-02
Chloride	0	8.6E+05	2.3E+05	na	--	6.0E+06	4.5E+06	na	--	2.2E+05	5.8E+04	na	--	1.5E+06	1.1E+06	na	--	1.5E+06	1.1E+06	na	--	6.0E+05
TRC	0	1.9E+01	1.1E+01	na	--	1.3E+02	2.1E+02	na	--	4.8E+00	2.8E+00	na	--	3.3E+01	5.4E+01	na	--	3.3E+01	5.4E+01	na	--	1.3E+01
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	4.2E+04	--	--	na	1.6E+02	--	--	na	4.2E+03	--	--	na	4.2E+03	4.2E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**				**Method**
(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**	**Target Value**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	3.4E+03	--	--	na	1.3E+01	--	--	na	3.4E+02	**--**	**--**	**na**	**3.4E+02**	**3.4E+02**
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.9E+05	--	--	na	1.1E+03	--	--	na	2.9E+04	**--**	**--**	**na**	**2.9E+04**	**2.9E+04**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	4.2E+04	--	--	na	1.6E+02	--	--	na	4.2E+03	**--**	**--**	**na**	**4.2E+03**	**4.2E+03**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	3.9E+03	--	--	na	1.5E+01	--	--	na	3.9E+02	**--**	**--**	**na**	**3.9E+02**	**3.9E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	5.8E-01	8.0E-01	na	--	2.1E-02	1.0E-02	na	--	1.5E-01	2.0E-01	na	--	**1.5E-01**	**2.0E-01**	**na**	**--**	**5.8E-02**
Chromium III	0.12	3.1E+02	3.2E+01	na	--	2.2E+03	6.3E+02	na	--	7.7E+01	8.2E+00	na	--	5.4E+02	1.6E+02	na	--	**5.4E+02**	**1.6E+02**	**na**	**--**	**9.4E+01**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.1E+02	2.1E+02	na	--	4.0E+00	2.8E+00	na	--	2.8E+01	5.4E+01	na	--	**2.8E+01**	**5.4E+01**	**na**	**--**	**1.1E+01**
Chromium, Total	0.12	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	2.6E+02	--	**--**	**--**	**na**	**--**	**0.0E+00**
Chrysene [C]	0	--	--	3.8E-02	1.8E-02	--	--	na	4.7E-01	--	--	3.8E-03	1.8E-03	--	--	9.9E-02	4.7E-02	**--**	**--**	**na**	**4.7E-02**	**4.7E-02**
Copper	0.68	6.7E+00	3.8E+00	na	--	4.3E+01	6.1E+01	na	--	2.2E+00	1.5E+00	na	--	1.1E+01	1.6E+01	na	--	**1.1E+01**	**1.6E+01**	**na**	**--**	**4.5E+00**
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	1.5E+02	1.0E+02	na	4.2E+05	5.5E+00	1.3E+00	na	1.6E+03	3.9E+01	2.5E+01	na	4.2E+04	**3.9E+01**	**2.5E+01**	**na**	**4.2E+04**	**1.5E+01**
DDD [C]	0	--	--	na	3.1E-03	--	--	na	8.1E-02	--	--	na	3.1E-04	--	--	na	8.1E-03	**--**	**--**	**na**	**8.1E-03**	**8.1E-03**
DDE [C]	0	--	--	na	2.2E-03	--	--	na	5.7E-02	--	--	na	2.2E-04	--	--	na	5.7E-03	**--**	**--**	**na**	**5.7E-03**	**5.7E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	7.7E+00	2.0E-02	na	5.7E-02	2.8E-01	2.5E-04	na	2.2E-04	1.9E+00	4.9E-03	na	5.7E-03	**1.9E+00**	**4.9E-03**	**na**	**5.7E-03**	**2.9E-03**
Demeton	0	--	1.0E-01	na	--	--	2.0E+00	na	--	--	2.5E-02	na	--	--	4.9E-01	na	--	**--**	**4.9E-01**	**na**	**--**	**4.9E-01**
Diazinon	0	1.7E-01	1.7E-01	na	--	1.2E+00	3.3E+00	na	--	4.3E-02	4.3E-02	na	--	3.0E-01	8.3E-01	na	--	**3.0E-01**	**8.3E-01**	**na**	**--**	**1.2E-01**
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	4.7E+00	--	--	na	1.8E-02	--	--	na	4.7E-01	**--**	**--**	**na**	**4.7E-01**	**4.7E-01**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	3.4E+04	--	--	na	1.3E+02	--	--	na	3.4E+03	**--**	**--**	**na**	**3.4E+03**	**3.4E+03**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	2.5E+04	--	--	na	9.6E+01	--	--	na	2.5E+03	**--**	**--**	**na**	**2.5E+03**	**2.5E+03**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	4.9E+03	--	--	na	1.9E+01	--	--	na	4.9E+02	**--**	**--**	**na**	**4.9E+02**	**4.9E+02**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	7.3E+00	--	--	na	2.8E-02	--	--	na	7.3E-01	**--**	**--**	**na**	**7.3E-01**	**7.3E-01**
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	4.4E+03	--	--	na	1.7E+01	--	--	na	4.4E+02	**--**	**--**	**na**	**4.4E+02**	**4.4E+02**
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	9.6E+03	--	--	na	3.7E+01	--	--	na	9.6E+02	**--**	**--**	**na**	**9.6E+02**	**9.6E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.8E+05	--	--	na	7.1E+02	--	--	na	1.8E+04	**--**	**--**	**na**	**1.8E+04**	**1.8E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	2.6E+05	--	--	na	1.0E+03	--	--	na	2.6E+04	**--**	**--**	**na**	**2.6E+04**	**2.6E+04**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	7.5E+03	--	--	na	2.9E+01	--	--	na	7.5E+02	**--**	**--**	**na**	**7.5E+02**	**7.5E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	3.9E+03	--	--	na	1.5E+01	--	--	na	3.9E+02	**--**	**--**	**na**	**3.9E+02**	**3.9E+02**
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	5.5E+03	--	--	na	2.1E+01	--	--	na	5.5E+02	**--**	**--**	**na**	**5.5E+02**	**5.5E+02**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	1.7E+00	1.1E+00	na	1.4E-02	6.0E-02	1.4E-02	na	5.4E-05	4.2E-01	2.7E-01	na	1.4E-03	**4.2E-01**	**2.7E-01**	**na**	**1.4E-03**	**1.4E-03**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	1.1E+06	--	--	na	4.4E+03	--	--	na	1.1E+05	**--**	**--**	**na**	**1.1E+05**	**1.1E+05**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	2.2E+04	--	--	na	8.5E+01	--	--	na	2.2E+03	**--**	**--**	**na**	**2.2E+03**	**2.2E+03**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.9E+07	--	--	na	1.1E+05	--	--	na	2.9E+06	**--**	**--**	**na**	**2.9E+06**	**2.9E+06**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	1.2E+05	--	--	na	4.5E+02	--	--	na	1.2E+04	**--**	**--**	**na**	**1.2E+04**	**1.2E+04**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.4E+05	--	--	na	5.3E+02	--	--	na	1.4E+04	**--**	**--**	**na**	**1.4E+04**	**1.4E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	7.3E+03	--	--	na	2.8E+01	--	--	na	7.3E+02	**--**	**--**	**na**	**7.3E+02**	**7.3E+02**
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	8.8E+02	--	--	na	3.4E+00	--	--	na	8.8E+01	**--**	**--**	**na**	**8.8E+01**	**8.8E+01**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.3E-06	--	--	na	5.1E-09	--	--	na	1.3E-07	**--**	**--**	**na**	**1.3E-07**	**1.3E-07**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	5.2E+01	--	--	na	2.0E-01	--	--	na	5.2E+00	**--**	**--**	**na**	**5.2E+00**	**5.2E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.5E+00	1.1E+00	na	2.3E+03	5.5E-02	1.4E-02	na	8.9E+00	3.9E-01	2.7E-01	na	2.3E+02	**3.9E-01**	**2.7E-01**	**na**	**2.3E+02**	**1.5E-01**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.5E+00	1.1E+00	na	2.3E+03	5.5E-02	1.4E-02	na	8.9E+00	3.9E-01	2.7E-01	na	2.3E+02	**3.9E-01**	**2.7E-01**	**na**	**2.3E+02**	**1.5E-01**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	1.5E+00	1.1E+00	--	--	5.5E-02	1.4E-02	--	--	3.9E-01	2.7E-01	--	--	**3.9E-01**	**2.7E-01**	**--**	**--**	**1.5E-01**
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	2.3E+03	--	--	na	8.9E+00	--	--	na	2.3E+02	**--**	**--**	**na**	**2.3E+02**	**2.3E+02**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	6.0E-01	7.0E-01	na	1.6E+00	2.2E-02	9.0E-03	na	6.0E-03	1.5E-01	1.8E-01	na	1.6E-01	**1.5E-01**	**1.8E-01**	**na**	**1.6E-01**	**6.0E-02**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	7.8E+00	--	--	na	3.0E-02	--	--	na	7.8E-01	**--**	**--**	**na**	**7.8E-01**	**7.8E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**				Method
(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**	**Target Value**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	5.5E+04	--	--	na	2.1E+02	--	--	na	5.5E+03	**--**	**--**	**na**	**5.5E+03**	**5.5E+03**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	3.6E+03	--	--	na	1.4E+01	--	--	na	3.6E+02	**--**	**--**	**na**	**3.6E+02**	**3.6E+02**
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.4E+05	--	--	na	5.3E+02	--	--	na	1.4E+04	**--**	**--**	**na**	**1.4E+04**	**1.4E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Guthion	0	--	1.0E-02	na	--	--	2.0E-01	na	--	--	2.5E-03	na	--	--	4.9E-02	na	--	**--**	**4.9E-02**	**na**	**--**	**4.9E-02**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	3.6E+00	7.4E-02	na	2.1E-02	1.3E-01	9.5E-04	na	7.9E-05	9.1E-01	1.9E-02	na	2.1E-03	**9.1E-01**	**1.9E-02**	**na**	**2.1E-03**	**2.1E-03**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	3.6E+00	7.4E-02	na	1.0E-02	1.3E-01	9.5E-04	na	3.9E-05	9.1E-01	1.9E-02	na	1.0E-03	**9.1E-01**	**1.9E-02**	**na**	**1.0E-03**	**1.0E-03**
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	7.5E-02	--	--	na	2.9E-04	--	--	na	7.5E-03	**--**	**--**	**na**	**7.5E-03**	**7.5E-03**
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	4.7E+03	--	--	na	1.8E+01	--	--	na	4.7E+02	**--**	**--**	**na**	**4.7E+02**	**4.7E+02**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	1.3E+00	--	--	na	4.9E-03	--	--	na	1.3E-01	**--**	**--**	**na**	**1.3E-01**	**1.3E-01**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	4.4E+00	--	--	na	1.7E-02	--	--	na	4.4E-01	**--**	**--**	**na**	**4.4E-01**	**4.4E-01**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	6.7E+00	--	na	4.7E+01	2.4E-01	--	na	1.8E-01	1.7E+00	--	na	4.7E+00	**1.7E+00**	**--**	**na**	**4.7E+00**	**6.7E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.9E+04	--	--	na	1.1E+02	--	--	na	2.9E+03	**--**	**--**	**na**	**2.9E+03**	**2.9E+03**
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	8.6E+02	--	--	na	3.3E+00	--	--	na	8.6E+01	**--**	**--**	**na**	**8.6E+01**	**8.6E+01**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	3.9E+01	na	--	--	5.0E-01	na	--	--	9.8E+00	na	--	**--**	**9.8E+00**	**na**	**--**	**9.8E+00**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	4.7E+00	--	--	na	1.8E-02	--	--	na	4.7E-01	**--**	**--**	**na**	**4.7E-01**	**4.7E-01**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	2.5E+05	--	--	na	9.6E+02	--	--	na	2.5E+04	**--**	**--**	**na**	**2.5E+04**	**2.5E+04**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	**--**	**0.0E+00**	**na**	**--**	**0.0E+00**
Lead	0	4.1E+01	3.5E+00	na	--	2.9E+02	6.8E+01	na	--	1.0E+01	8.7E-01	na	--	7.2E+01	1.7E+01	na	--	**7.2E+01**	**1.7E+01**	**na**	**--**	**1.0E+01**
Malathion	0	--	1.0E-01	na	--	--	2.0E+00	na	--	--	2.5E-02	na	--	--	4.9E-01	na	--	**--**	**4.9E-01**	**na**	**--**	**4.9E-01**
Mercury	0	1.4E+00	7.7E-01	- -	- -	9.8E+00	1.5E+01	- -	- -	3.5E-01	1.9E-01	- -	--	2.5E+00	3.8E+00	- -	--	**2.5E+00**	**3.8E+00**	**- -**	**- -**	**9.8E-01**
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	3.9E+04	--	--	na	1.5E+02	--	--	na	3.9E+03	**--**	**--**	**na**	**3.9E+03**	**3.9E+03**
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	1.5E+05	--	--	na	5.9E+02	--	--	na	1.5E+04	**--**	**--**	**na**	**1.5E+04**	**1.5E+04**
Methoxychlor	0	--	3.0E-02	na	--	--	5.9E-01	na	--	--	7.5E-03	na	--	--	1.5E-01	na	--	**--**	**1.5E-01**	**na**	**--**	**8.8E-02**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	**--**	**0.0E+00**	**na**	**--**	**0.0E+00**
Nickel	0.38	9.7E+01	8.6E+00	na	4.6E+03	6.8E+02	1.6E+02	na	1.2E+05	2.5E+01	2.4E+00	na	4.6E+02	1.7E+02	4.0E+01	na	1.2E+04	**1.7E+02**	**4.0E+01**	**na**	**1.2E+04**	**2.4E+01**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.8E+04	--	--	na	6.9E+01	--	--	na	1.8E+03	**--**	**--**	**na**	**1.8E+03**	**1.8E+03**
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	7.8E+02	--	--	na	3.0E+00	--	--	na	7.8E+01	**--**	**--**	**na**	**7.8E+01**	**7.8E+01**
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	1.6E+03	--	--	na	6.0E+00	--	--	na	1.6E+02	**--**	**--**	**na**	**1.6E+02**	**1.6E+02**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	1.3E+02	--	--	na	5.1E-01	--	--	na	1.3E+01	**--**	**--**	**na**	**1.3E+01**	**1.3E+01**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.0E+02	1.3E+02	na	--	7.0E+00	1.7E+00	--	--	4.9E+01	3.2E+01	--	--	**4.9E+01**	**3.2E+01**	**na**	**--**	**1.9E+01**
Parathion	0	6.5E-02	1.3E-02	na	--	4.6E-01	2.5E-01	na	--	1.6E-02	3.3E-03	na	--	1.1E-01	6.3E-02	na	--	**1.1E-01**	**6.3E-02**	**na**	**--**	**3.8E-02**
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	2.7E-01	na	1.7E-02	--	3.5E-03	na	6.4E-05	--	6.8E-02	na	1.7E-03	**--**	**6.8E-02**	**na**	**1.7E-03**	**1.7E-03**
Pentachlorophenol [C]	0	3.7E+00	2.8E+00	na	3.0E+01	2.6E+01	5.4E+01	na	7.8E+02	9.3E-01	6.9E-01	na	3.0E+00	6.5E+00	1.3E+01	na	7.8E+01	**6.5E+00**	**1.3E+01**	**na**	**7.8E+01**	**2.6E+00**
Phenol	0	--	--	na	8.6E+05	--	--	na	2.2E+07	--	--	na	8.6E+04	--	--	na	2.2E+06	**--**	**--**	**na**	**2.2E+06**	**2.2E+06**
Pyrene	0	--	--	na	4.0E+03	--	--	na	1.0E+05	--	--	na	4.0E+02	--	--	na	1.0E+04	**--**	**--**	**na**	**1.0E+04**	**1.0E+04**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**				**Method**
(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**	**Target Value**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	1.4E+02	9.8E+01	na	1.1E+05	5.0E+00	1.3E+00	na	4.2E+02	3.5E+01	2.4E+01	na	1.1E+04	**3.5E+01**	**2.4E+01**	**na**	**1.1E+04**	**1.4E+01**
Silver	0	9.6E-01	--	na	--	6.7E+00	--	na	--	2.4E-01	--	na	--	1.7E+00	--	na	--	**1.7E+00**	**--**	**na**	**--**	**6.7E-01**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	1.0E+03	--	--	na	4.0E+00	--	--	na	1.0E+02	**--**	**--**	**na**	**1.0E+02**	**1.0E+02**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	8.6E+02	--	--	na	3.3E+00	--	--	na	8.6E+01	**--**	**--**	**na**	**8.6E+01**	**8.6E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	1.2E+01	--	--	na	4.7E-02	--	--	na	1.2E+00	**--**	**--**	**na**	**1.2E+00**	**1.2E+00**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.6E+05	--	--	na	6.0E+02	--	--	na	1.6E+04	**--**	**--**	**na**	**1.6E+04**	**1.6E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	5.1E+00	3.9E-03	na	7.3E-02	1.8E-01	5.0E-05	na	2.8E-04	1.3E+00	9.8E-04	na	7.3E-03	**1.3E+00**	**9.8E-04**	**na**	**7.3E-03**	**5.9E-04**
Tributyltin	0	4.6E-01	7.2E-02	na	--	3.2E+00	1.4E+00	na	--	1.2E-01	1.8E-02	na	--	8.1E-01	3.5E-01	na	--	**8.1E-01**	**3.5E-01**	**na**	**--**	**2.1E-01**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.8E+03	--	--	na	7.0E+00	--	--	na	1.8E+02	**--**	**--**	**na**	**1.8E+02**	**1.8E+02**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	4.2E+03	--	--	na	1.6E+01	--	--	na	4.2E+02	**--**	**--**	**na**	**4.2E+02**	**4.2E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	7.8E+03	--	--	na	3.0E+01	--	--	na	7.8E+02	**--**	**--**	**na**	**7.8E+02**	**7.8E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	6.2E+02	--	--	na	2.4E+00	--	--	na	6.2E+01	**--**	**--**	**na**	**6.2E+01**	**6.2E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**	**0.0E+00**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	6.2E+02	--	--	na	2.4E+00	--	--	na	6.2E+01	**--**	**--**	**na**	**6.2E+01**	**6.2E+01**
Zinc	2.55	6.2E+01	5.0E+01	na	2.6E+04	4.2E+02	9.3E+02	na	6.8E+05	1.7E+01	1.4E+01	na	2.6E+03	1.1E+02	2.3E+02	na	6.8E+04	**1.1E+02**	**2.3E+02**	**na**	**6.8E+04**	**4.3E+01**

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.

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

Discharge Flow Used for WQS-WLA Calculations (MGD 1.000

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	6.000	6.000	7.000	7.000
7Q10	18.500	N/A	19.500	N/A
30Q10	25.000	25.000	26.000	26.000
30Q5	25.000	N/A	26.000	N/A
Harm. Mean	25.000	N/A	26.000	N/A
Annual Avg.	0.000	N/A	1.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	23.600	21.886
30Q10 90th% Temp. Mix (deg C)	22.942	22.481
1Q10 90th% pH Mix (SU)	7.447	7.447
30Q10 90th% pH Mix (SU)	7.412	7.412
1Q10 10th% pH Mix (SU)	6.150	N/A
7Q10 10th% pH Mix (SU)	6.117	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	47.4	47.4
7Q10 Hardness (mg/L as CaCO3)	36.3	36.3

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.447
(7.204 - pH)	-0.243
(pH - 7.204)	0.243
Trout Present Criterion (mg N/l	14.357
Trout Absent Criterion (mg N/L	21.499
Trout Present?	n
Effective Criterion (mg N/L)	21.499

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	22.942
90th Percentile pH (SU)	7.412
MIN	1.656
MAX	22.942
(7.688 - pH)	0.276
(pH - 7.688)	-0.276
Early LS Present Criterion (mg N	2.725
Early LS Absent Criterion (mg N/	2.725
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.725

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.447
(7.204 - pH)	-0.243
(pH - 7.204)	0.243
Trout Present Criterion (mg N/l	14.357
Trout Absent Criterion (mg N/L	21.499
Trout Present?	n
Effective Criterion (mg N/L)	21.499

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	22.481
90th Percentile pH (SU)	7.412
MIN	1.706
MAX	22.481
(7.688 - pH)	0.276
(pH - 7.688)	-0.276
Early LS Present Criterion (mg N	2.807
Early LS Absent Criterion (mg N/	2.807
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.807

1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD 1.000

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	6.000	6.000	7.000	7.000
7Q10	18.500	N/A	19.500	N/A
30Q10	25.000	25.000	26.000	26.000
30Q5	25.000	N/A	26.000	N/A
Harm. Mean	25.000	N/A	26.000	N/A
Annual Avg.	0.000	N/A	1.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	23.600	21.886
30Q10 90th% Temp. Mix (deg C)	22.942	22.481
1Q10 90th% pH Mix (SU)	7.447	7.447
30Q10 90th% pH Mix (SU)	7.412	7.412
1Q10 10th% pH Mix (SU)	6.150	N/A
7Q10 10th% pH Mix (SU)	6.117	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	47.429	47.429
7Q10 Hardness (mg/L as CaCO3) =	36.256	36.256

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	7.447
(7.204 - pH)	-0.243
(pH - 7.204)	0.243
Trout Present Criterion (mg N/l	14.357
Trout Absent Criterion (mg N/L	21.499
Trout Present?	n
Effective Criterion (mg N/L)	21.499

Ammonia - Dry Season - Chronic

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90th Percentile pH (SU)	7.412
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(7.688 - pH)	0.276
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Early LS Present Criterion (mg N	2.725
Early LS Absent Criterion (mg N/	2.725
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.725

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	7.447
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(pH - 7.204)	0.243
Trout Present Criterion (mg N/l	14.357
Trout Absent Criterion (mg N/L	21.499
Trout Present?	n
Effective Criterion (mg N/L)	21.499

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	22.481
90th Percentile pH (SU)	7.412
MIN	1.706
MAX	22.481
(7.688 - pH)	0.276
(pH - 7.688)	-0.276
Early LS Present Criterion (mg N	2.807
Early LS Absent Criterion (mg N/	2.807
Early Life Stages Present?	y
Effective Criterion (mg N/L)	2.807

Stream/Discharge Mix Values

	Acute	Chronic
Hardness	100.00	100.00
Hardness used	100.00	100.00
90th % pH	7.00	7.00
10th % pH	0.78	1.16
90th % Temp (Annual)	23.17	23.07
90th % Temp (Winter)	10.00	10.00
Salinity	14.08	15.72

Ammonia Criteria Determinations

Freshwater Ammonia Criteria - Annual

Duration	NH3-N
Acute	36.09
Chronic - ELS present	3.41
Chronic - ELS absent	3.41

Saltwater Ammon. Criteria - Annual

Duration	NH3-N
Acute	42.45
Chronic	6.49

Freshwater Ammonia Criteria - Winter

Duration	NH3-N
Acute	36.09
Chronic - ELS present	5.91
Chronic - ELS absent	7.91

Saltwater Ammon. Criteria - Winter

Duration	NH3-N
Acute	113.04
Chronic	17.16

FACILITY INFORMATION

FACILITY: Ronile, Inc.

LOCATION: Rocky Mount, Franklin County

VPDES PERMIT NUMBER: VA0076015 **Expiration Date:** 09/20/18

SIC CODE/DESCRIPTION: 2269/Finishers of textiles, not elsewhere classified

OUTFALLS/FLOWS (MGD): **Outfall 001** = 0.158 MGD (Maximum 30-day flow). Wastewater sources are process wastewater from the dyeing and finishing of nylon, polyester and wool yarn and storm water from a fuel oil tank berm. Treatment includes an aerated lagoon, polymer addition, flocculation, sedimentation, and a plate and frame filter press.

RECEIVING STREAM/CRITICAL FLOWS/IWC:

Receiving Stream:	Pigg River
River Basin:	Roanoke River
Subbasin:	Roanoke River
Section:	6a
Class:	III
Special Standards:	None

1Q10 = 6.1 MGD IWCa = 2.56% (Dilution calculated by CORMIX = 7)
7Q10 = 6.8 MGD IWCc = 2.29%(Dilution calculated by CORMIX = 19.5)
30Q5 = 12 MGD
Harmonic mean = 27 MGD

FACILITY PROCESS AND TREATMENT:

This facility has six main dye lines at this plant and one smaller scale sample dye line. The yarn is creeled and run through a heat setter to bulk-up the yarn and set the width. From the heat setter, yarn is run through the dye machines, which contain a mixture of dye and dye setting chemicals. A steam box sets the dye and finish that was present on the yarn before dyeing is removed by washing, which gives the rinse water a milky appearance. A two-stage counter-current washing method is used. Supposedly, no dye is removed in this step. To dry the yarn, it passes through padded rollers and a dryer. Once dried, the yarn is temporarily stored in J-boxes at the end of the production line, prior to being routed to the mill, where it is spun onto cones and prepared for shipping. Batch dyeing of small cotton blend rugs, that were believed to be the major source of zinc and DDT, was discontinued in April 2013. Small lots of scoured wool dyeing began in August 2013. According to the facility, large amounts of wool were dyed in 2001-2003. The company does not have plans to dye wool in the foreseeable future.

If dyed, finished wool may be treated with Evercide (25% strength of permetherin) and would be applied at 0.014% of dry wool yarn weight, yielding an overall application of permetherin of 1/4th that (or 0.0035%). Ronile has designed and built a special Evercide applicator that would

hold 20 gallons of Evercide and that would only be used when running this wool product. This new applicator does not need to be cleaned out since it is only being used for this wool product. As an added precaution Ronile built a catch basin underneath this new applicator which is sufficient in size to catch the entire contents of the applicator should it leak or spill. The system is engineered so that no permetherin will go to the waste water treatment lagoon/plant.

The wastewater treatment plant receives flow from the production area, as well as on-site storm water and roof drainage from the Therminol boiler room. In 2001, the wastewater treatment plant was upgraded to provide more effective treatment. The 5 MG aerated lagoon was partitioned into two separate areas, 4 MG for aeration and 1 MG for activated sludge. Wastewater flows from the plant into the head of the lagoon, which serves as an equalization (EQ) basin. A baffle curtain in the lagoon separates the EQ basin from the aerator. Daily jar tests are conducted to determine the polymer dose to achieve of a color of 250-350 ADMI.

The supplier of polymers has changed every few years as the facility tries to comply with permit limits for WET and metals. Zetag polymers were used prior to about 2012. Polymer dose varies with the temperature of the aeration basin, which mirrors the seasonal temperature. Floc is settled in a small settling basin.

2012 – 3/17 Southeastern Laboratories polymers used, one failed acute test 3/2015, one failed chronic test 2014
SELfloc 1638 replaced Zetag 7197 a dose of 150 to 350 ppm
SELfloc 1840B replaced Zetag 8680, a dry polymer, used at a dose of 3 to 7 ppm
Polymer, Zetag 7867, and a debulking agent, perlite, are added to the sludge prior to pressing in a plate and frame filter press.
***SELfloc** 2012, containing **sodium dimethyl dithiocarbamate**, for zinc precipitation, was discontinued in fall 2012, after its use was shown to result in failed WET tests.*

3/17 – 10/17 Bond Water Technologies polymers used, failed chronic tests August and September 2017
BondClear 1330-S, CAS# 25988-97-0, cationic copolymer of epichlorhydrin and dimethyl amine, dose 94.8 ppm, LC50 *D magna* 10 ppm, LD50 Zebra fish 10 ppm, stopped use 10/10/2017, and resumed use on 4/25/2018
BondClear 400S, CAS# 12042-91-0, 50% Al chlorohydrate, dose 80 ppm, EC50 FHM 804 ppm, EC50 *C dubia* 33 ppm
BondClear 2431-90S, CAS# 124-04-9, cationic polymer, <2% adipic acid, dose 0.4 ppm, LC50 fish 10-100 ppm, EC50 (daphnia) 10-100 ppm. Use stopped on 6/19/18.

10/17 - 4/18	One failed acute test 3/2018. **BondClear 1330-B** started on 10/10/17 and stopped use on 4/25/18. EC50 D magna >10 ppm (w/10% humic acid) CAS# 42751-79-1 25-50% 1,2-Ethanediamine polymer with (chloromethyl)oxirane and N-methylmethanamine. **BondClear 400S,** CAS# 12042-91-0, 50% Al chlorohydrate, dose 80 ppm, EC50 FHM 804 ppm, EC50 *C dubia* 33 ppm **BondClear 2431-90S**, CAS# 124-04-9, cationic polymer, <2% adipic acid, dose 0.4 ppm, LC50 fish 10-100 ppm, EC50 (daphnia) 10-100 ppm. Use stopped on 6/19/18.
4/18- 6/18	no WET samples **BondClear 1330-S**, CAS# 25988-97-0, cationic copolymer of epichlorhydrin and dimethyl amine, dose 94.8 ppm, LC50 *D magna* 10 ppm, LD50 Zebra fish 10 ppm, stopped use 10/10/2017, and resumed use on 4/25/2018 **BondClear 400S**, CAS# 12042-91-0, 50% Al chlorohydrate, dose 80 ppm, EC50 FHM 804 ppm, EC50 *C dubia* 33 ppm **BondClear 2431-90S**, CAS# 124-04-9, cationic polymer, <2% adipic acid, dose 0.4 ppm, LC50 fish 10-100 ppm, EC50 (daphnia) 10-100 ppm. Use stopped on 6/19/18.
6/19/18	6/25 acute sample **BondClear 1330-S**, CAS# 25988-97-0, cationic copolymer of epichlorhydrin and dimethyl amine, dose 94.8 ppm, LC50 *D magna* 10 ppm, LD50 Zebra fish 10 ppm, stopped use 10/10/2017, and resumed use on 4/25/2018 **BondClear 400S**, CAS# 12042-91-0, 50% Al chlorohydrate, dose 80 ppm, EC50 FHM 804 ppm, EC50 *C dubia* 33 ppm **BondClear** 3211-50S (anionic polymer emulsion) started on 6/19/18, replaced 2431-90S, no CAS# listed on SDS, 48H EC50 >100 ppm (daphnia), 96h LC50 >100 ppm (fish)

Sludge from the settling basin is either returned to the aerated lagoon as activated sludge or is pumped to the sludge holding tank. Perlite dust, sodium potassium aluminum silicate, is used a filter aid agent in sludge pressing. Sludge cake is disposed of at the local Franklin County Sanitary Landfill. Supernatant decant from the sludge holding tank and filtrate from the plate filter press are returned to the aeration basin.

Outfall 001 is a six-inch single pipe diffuser that has slots cut into the pipe, with a blind flange at the end. Ports of two different sizes. The Pigg River, at the outfall location, has a sandy bottom, is approximately 35-feet in width. It has a riffle and pool character, with a long pool at the discharge area. The next riffle area is about 0.25 miles downstream. Although the discharge enters the river near the end of a sharp bend, the next half a mile of the river has a slight curve. CORMIX estimates dilution of 7:1 for acute mixing (1Q10) and 19.5:1 for chronic mixing (7Q10).

A WET limit of 3.1 TUa was effective on September 30, 2004, and on September 21, 2012, was reduced to 2.1 TUa. An effluent limit for zinc also became effective in 2012. Zinc was present in

the latex backing of cotton rugs that were batch dyed at the facility. A low pH in part of the dyeing process may have leached zinc from the backing. Cotton rug dyeing was stopped around the end of April 2013. Wool has not been dyed at the facility since August 2015.

Effluent from outfall 001 exhibited chronic toxicity from 2001-3, which was the period of time that large amounts of wool was dyed. If there are major changes in the type or level of production, such as if wool dyeing becomes a bigger portion of the total production at the facility, then the effluent should be recharacterized through quarterly testing should begin. Since a timetable of type of material dyed when each chronic WET test was performed, has not been documented, the type and level of production preceding each WET test should be documented and submitted with each WET report. At current flow rates, the WWTP has about 50 days of storage. Based on 5 day work weeks would be about 10 weeks.

WET limit calculation using GM 00-2012, Appendix D:

From CORMIX Acute dilution = 7; chronic dilution = 19.5

WLAs Acute = 0.3 x 7 = 2.1 TUa; Chronic 1 x 19.5 = 19.5 TUc

Acute to chronic ratio (ACR) from data since 12/2013:
C. dubia 7/2014 chronic test, ACR = 100/2.5 = 40
C. dubia 9/2017 chronic test, ACR = 47/0.6 = 74.5
Using the geometric mean of 2 actual ACRs = 53.9, WLAa,c = 2.1 x 53.9 = 113.2

WET limit from WETLIM10 spreadsheet is an NOAEC = 100%

WET Requirements:

Outfall 001 – NOAEC WET limit of 100% using *C. dubia*. The report submittal should include an estimate of type and amount of material dyed during the preceding quarter.

Prior to adding a new process, new fabric or dye or WWTP polymers, acute and chronic WETs test on effluent from jar test of proposed material must pass WET tests using both species.

Table 1 Acute Test Results, Ronile, Inc.; VA0076015, Outfall 001
WET = 2.1 TUa final on 9/21/2012

Test Date	Test Organism	LC_{50} (%)	% Survival in 100% effluent	Testing Laboratory
10/29/13 Q1	*C. dubia*	> 100	100	CBI
02/12/14 Q2	*C. dubia*	> 100	100	CBI
05/14/14 Q3	*C. dubia*	52 (1.9 TUa)	30	CBI
7/23/14[9,10] Q4	*C. dubia*	> 100	100	CBI
12/12/14 Q5	*C. dubia*	> 100	100	CBI
03/19/15[11] Q6	*C. dubia*	**25 (4.0 TUa)**	zero	CBI
06/11/15 Q7	*C. dubia*	> 100	100	CBI
09/23/15 Q8	*C. dubia*	> 100	90	CBI
10/22/15 Q9	*C. dubia*	> 100	100	CBI
01/07/16 Q10	*C. dubia*	> 100	100	CBI
06/09/16 Q11	*C. dubia*	> 100	100	CBI
09/14/16 Q12	*C. dubia*	> 100	55	CBI
10/27/16 Q13	*C. dubia*	> 100	100	CBI
01/06/17 Q14	*C. dubia*	81 (1.2 TUa)	20	CBI
New polymer	use begins			
06/08/17 Q15	*C. dubia*	> 100	100	CBI
08/23/17 Q16	*C. dubia*	71 (1.4 TUa)	10	CBI
12/14/17 Q17	*C. dubia*	70 (1.4 TUa)	0	CBI
3/23/18 Q18	*C. dubia*	**30 (3.3 TUa)**	0 in 100% & 69%	CBI
Polymer changed	to 3211-50S	(6/19/18).		
6/29/18 Q19	*C. dubia*	61.6 (1.6 TUa)	0	CBI

Table 2. Chronic Toxicity Test Results for Ronile, Inc.; VA0076015, Outfall 001 – IWC = 2.1%, Endpoint is an NOEC of 5 % (TUc = 20)

Test Date	Test Organism	%NOEC Surv'l	%NOEC Rpro-Grth	TUc	% Survival in 100% Eff	48h LC50	Lab
12/13 Q1	C. dubia	100	10	10	100	>100	CBI
12/13 Q1	*P. promelas*	100	100	1	90	>100	CBI
02/14 Q2	*C. dubia*	100	5	20	90	>100	CBI
02/14 Q2	*P. promelas*	100	100	1	100	>100	CBI
05/14 Q3	*C. dubia*	20	10	10	0	>100	CBI
05/14 Q3	*P. promelas*	20	20	5	30	>100	CBI
07/14[9,10] Q4	*C. dubia*	20	**2.5**	**40**	0	100	CBI
	ACR =	100/2.5	**= 40**	**Ln = 3.68887**			
07/14 Q4	*P. promelas*	20	20	5	72.5	>100	CBI
09/22/15 A1	*C. dubia*	100	20	5	100	>100	CBI
09/22/15 A1	*P. promelas*	100	20	5	92.5	>100	CBI
09/22/16 A2	*C. dubia*	20	20	5	40	>100	CBI
09/22/16 A2	*P. promelas*	20	20	5	82.5	>100	CBI
08/22/17 A3	*C. dubia*	20	**<2.5**	**>40**	10	>100	CBI
08/22/17 A3	*P. promelas*	100	20	5	80	>100	CBI
09/26/17 A3	*C. dubia*	20	**0.6**	**166**	0	44.7	CBI
	ACR =	44.7/.6	=**74.5**	**Ln = 5.11199**			

1. The TRE plan involved the replacement of the Space Dye Injection Machines with the #7 Dye Line Machines. The Space Dye Injection Machines were removed from the facility in February 2002. Due to the long retention time in the WWTP lagoon (~40 days), the August 2002 test may not be representative of effluent after these machines were removed.
2. Latex-backed [containing zinc] rug dyeing started between February and May of 2005. The 4/2005 passing chronic test may or may not be representative of this operation.
3. Per Ronile fewer latex-backed rugs being dyed in 2010.
4. Time proportional samples, flows varied by 12.5%.
5. Flow composite sampler functional September 13, 2011.
6. Polymer Selfloc XP2012, containing sodium dimethyl dithiocarbamate, for precipitation of zinc, begun August 2012, was believed to be cause of toxicity in September 2012 samples. XP2012 use in the WWTP was stopped around November 2012. Latex-backed rug dyeing was discontinued in April 2013.
7. Wool dyeing, in small quantities, began mid 8/2013, making up about 2.2% of wastewater flow.
8. Feb 2014, wool dyed < 0.01% of total
9. Started flocculation at higher pH in June 2014, after zinc exceeded limit in May 2014.
10. Caustic change to MgOH planned as a result of 7/14 high TUc, per 8/5/14 letter.
11. WET failed 3/2018. Lagoon froze. Sample was brown, which is not typical of effluent (usually pink). COD, ppm; Feb=339, Mar= 295. Ave over past18 months = 146, 4 highest mos. 12/2014 – 3/2015

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 2.1

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	28.52020634	TU_c	NOEC =	4 %	Use as 25.00	TU_c
BOTH*	113.2582774	TU_c	NOEC =	1 %	Use as 100.00	TU_c
AML	28.52020634	TU_c	NOEC =	4 %	Use as 25.00	TU_c

Enter data in the cells with blue type:

ACUTE WLAa,c 113.258275

CHRONIC WLAc 19.5

Note: Inform the permittee that if the mean of the data exceeds this TUc: 11.7202268 a limit may result using STATS.EXE

* Both means acute expressed as chronic

Entry Date:	07/25/18			
Facility Name:	RONILE INC			
VPDES Number:	VA0076015			
Outfall Number:	001			
		% Flow to be used from MIX.EXE	**Diffuser /modeling study?**	
Plant Flow:	0.158	MGD	Enter Y/N	y
Acute 1Q10:	6.1	MGD 100 %	Acute	7 :1
Chronic 7Q10:	6.8	MGD 100 %	Chronic	19.5 :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) y (NOEC<LC50, do not use greater/less than data) Go to Page 3

IWC_a	14.28571429 %	Plant flow/plant flow + 1Q10	**NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use**
IWC_c	5.128205128 %	Plant flow/plant flow + 7Q10	
Dilution, acute	7	100/IWCa	
Dilution, chronic	19.5	100/IWCc	
WLA_a	2.1	Instream criterion (0.3 TUa) X's Dilution, acute	
WLA_c	19.5	Instream criterion (1.0 TUc) X's Dilution, chronic	
$WLA_{a,c}$	113.2582746	ACR X's WLA_a - converts acute WLA to chronic units	
ACR -acute/chronic ratio	53.93251173	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 samples 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.**

$LTA_{a,c}$	46.54288769	WLAa,c X's eA						
LTA_c	11.72022735	WLAc X's eB					Rounded NOEC's	%
MDL** with $LTA_{a,c}$	113.2582774	TU_c	NOEC =	0.882938	(Protects from acute/chronic toxicity)		NOEC = 1	%
MDL** with LTA_c	28.52020634	TU_c	NOEC =	3.506286	(Protects from chronic toxicity)		NOEC = 4	%
AML with lowest LTA	28.52020634	TU_c	NOEC =	3.506286	Lowest LTA X's eD		NOEC = 4	

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

							Rounded LC50's	%
MDL with $LTA_{a,c}$	2.100000051	TU_a	LC50 =	47.619046	%		LC50 = 48	%
MDL with LTA_c	0.52881287	TU_a	LC50 =	189.102810	%	Use NOAEC=100%	LC50 = NA	

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	

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 53.93251173
Lowest ACR 53.93251173

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	100	2.5	40	3.6888795	3.688879454	40	0
2	44.7	0.6	74.5	4.3107991	3.987733482	53.9325117	53.93251173
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:			53.93251173

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

Table 3. **ACR used: 53.932512**

	Enter LC_{50}	TUc	Enter NOEC	TUc
1	100	53.932512		NO DATA
2	100	53.932512		NO DATA
3	52	103.716369		NO DATA
4	100	53.932512		NO DATA
5	100	53.932512		NO DATA
6	25	215.730047		NO DATA
7	100	53.932512		NO DATA
8	100	53.932512		NO DATA
9	100	53.932512		NO DATA
10	100	53.932512		NO DATA
11	100	53.932512		NO DATA
12	100	53.932512		NO DATA
13	100	53.932512		NO DATA
14	81	66.583348		NO DATA
15	100	53.932512		NO DATA
16	71	75.961284		NO DATA
17	70	77.046445		NO DATA
18	30	179.775039		NO DATA
19	61.6	87.552779		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		Limit	
	% Effluent	TUc	% Effluent	TUc
Dilution series based on data mean	8.5	11.72023		
Dilution series to use for limit			4	25
Dilution factor to recommend:	0.2921003		0.2	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	29.2	3.42	20.0	5.00
	8.5	11.72	4.0	25.00
	2.5	40.12	0.8	125.00
	0.73	137.36	0.2	625.00
Extra dilutions if needed	0.21	470.26	0.0	3125.00
	0.06	1609.93	0.0	15625.00

APPENDIX D

Documentation from previous permits

Analysis of the RONIL. .NC. effluent data for
DISSOLVED COPPER - EFFLUENT CONCENTRATION

The statistics for DISSOLVED COPPER - EFFLUENT CONCENTRATION are:

Number of values	=	8
Quantification level	=	10
Number < quantification	=	7
Expected value	=	6.244643
Variance	=	14.0384
C.V.	=	.6
Statistics used	=	Reasonable potential assumptions - Type 1 data

The Standards for DISSOLVED COPPER - EFFLUENT CONCENTRATION are:

Acute Standard	=	6.66
Chronic Standard	=	4.64
Human Health Standard	=	----

The 97th percentile of daily values	=	15.19582
The 97th percentile of 4 day averages	=	10.38978
The 97th percentile of 30 day averages	=	7.531372

The Acute standard is violated
The Chronic standard is violated
The Human health standard is not violated.

DATA
13
1
<10
<10
1
1
6
7

Analysis of the RONIL[illegible]NC. effluent data for COP[illegible]R
Averaging period for standard = 4 days

The statistics for COPPER are:

Number of values	= 1
Quantification level	= 10
Number < quantification	= 0
Expected value	= 12
Variance	= 51.84001
C.V.	= .6
97th percentile	= 29.20101
Statistics used	= Reasonable potential assumptions - Type 2 data

The WLAs for COPPER are:

Acute WLA	= 22.01
Chronic WLA	= 63.13
Human Health WLA	= ----

Limits are based on acute toxicity and 1 samples/month, 1 samples/week

Maximum daily limit	= 22.01
Average weekly limit	= 22.01
Average monthly limit	= 22.01

Note: The maximum daily limit applies to industrial dischargers
The average weekly limit applies to POTWs
The average monthly limit applies to both.

The Data are
12

6/9/2008 5:23:50 PM

Facility = Ronile
Chemical = total Recoverable Zinc
Chronic averaging period = 4
WLAa = 141
WLAc = 544
Q.L. = 10
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 899
Variance = 290952.
C.V. = 0.6
97th percentile daily values = 2187.64
97th percentile 4 day average = 1495.74
97th percentile 30 day average= 1084.24
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 141
Average Weekly limit = 141
Average Monthly LImit = 141

The data are:

899

7/9/2013 4:10:57 PM

Facility = Ronile inc
Chemical = zinc
Chronic averaging period = 4
WLAa   = 141
WLAc   = 544
Q.L.   = 10
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 7
Expected Value = 182.857
Variance   = 12037.2
C.V.   = 0.6
97th percentile daily values = 444.967
97th percentile 4 day average = 304.235
97th percentile 30 day average= 220.535
< Q.L.   = 0
Model used   = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit   = 141
Average Weekly limit = 141
Average Monthly LImit = 141

The data are:

 110
 230
 210
 150
 160
 240
 180

WLA Analysis For: Ronile, Inc. ANTIDEGRADATION Date: 03/10/99 Spreadsheet for Acute AWLAs

Stream:	Pigg River	Effluent Information		Hardness:			
Mean Hardness (mg/L) =	33	Mean Hardness=	58	acute	35.403846	Mix Hardness= acute	35.40384615
Stream NH3 (mg/L)	0	NH3 (mg/L)=		chronic	35.969121	chronic	35.96912
90% Temperature	22.2	90% Temp.=	26	7Q10 Ratio	8.42	* WLAa	
90% pH	7.5	90% pH=	8	1Q10 Ratio	10.4	Coefficient =	0.1923076923
Fractional 7Q10-MGD	7.42	100% of 7Q10 Flow, MGD=	1.000			Acute IWC =	0.0961538462
Fractional 1Q10-MGD	9.4			Harmonic ratio:	34.26	Chronic IWC =	0.1187648456
Harmonic mean (carcinogen):	33.26			30Q5 ratio:	11.91		
30Q5 Flow (Non-carcinogen):	10.91						
R(iver),L(ake) or S(torm):	R						
Trout Present? (Y/N)	n						
Public Water Supply(Y/N):	n						

			Aquatic Protection Freshwater Criteria							Human Health					
Parameter and Form	Carcinogen?	Sort? (Y/N)	Acute Criteria	Existing Quality at 1Q10	Chronic Criteria	Existing Quality at 7Q10	All Other Surface Water Criteria	Existing Quality for HH	Back-ground concentration	Acute Baseline	Chronic Baseline	Human Health Baseline	Acute AWLA	Chronic A WLA	Human Health A WLA
Ammonia (mg/l as N)		Y	11.495	0.550	N/A		None			3.2863	N/A	N/A	34.18	N/A	N/A
Arsenic		Y	None		N/A		50			0.0000	N/A	N/A	N/A	N/A	N/A
Cadmium		Y	1.22		N/A		None			0.3039	N/A	N/A	3.16	N/A	N/A
Chloride		Y	860000	9927	N/A		None			222445.2500	N/A	N/A	2313430.60	N/A	N/A
Chlorine		Y	19		N/A		None			4.7500	N/A	N/A	49.40	N/A	N/A
Copper		Y	6.66	0.60	N/A		None			2.1159	N/A	N/A	22.01	N/A	N/A
Cr III		Y	741.91	8.00	N/A		None		8.00	191.4771	N/A	N/A	1916.16	N/A	N/A
Cr-hex		Y	16		N/A		None			4.0000	N/A	N/A	41.60	N/A	N/A
Iron		Y	None		N/A		None			0.0000	N/A	N/A	N/A	N/A	N/A
Lead		Y	31.71	0.30	N/A		None			8.1519	N/A	N/A	84.78	N/A	N/A
Manganese		Y	None		N/A		None			0.0000	N/A	N/A	N/A	N/A	N/A
Mercury		Y	2.4		N/A		0.053			0.6000	N/A	N/A	6.24	N/A	
Nickel		Y	75.91		N/A		4600			18.9772	N/A	N/A	197.36	N/A	N/A
Selenium		Y	20		N/A		11000			5.0000	N/A	N/A	52.00	N/A	N/A
Silver		Y	0.68		N/A		None			0.1701	N/A	N/A	1.77	N/A	N/A
Toluene		Y	1750	1.12	N/A		200000			438.3400	N/A	N/A	4558.74	N/A	N/A
Xylene		Y	740	0.97	N/A		None			185.7275	N/A	N/A	1931.57		
Zinc		Y	48.55	1.89	N/A		None			13.5547	N/A	N/A	140.97	N/A	N/A
1,1-dichloroethylene		n	None		N/A		17000			0.0000	N/A	N/A	N/A	N/A	N/A
1,2-dichlorobenzene		n	None		N/A		17000			0.0000	N/A	N/A	N/A	N/A	N/A

1,2-dichloroethane	C	n	None		N/A	990		0.0000	N/A	N/A	N/A	N/A	N/A	
1,2,4-trichlorobenzene		n	None		N/A	950		0.0000	N/A	N/A	N/A	N/A	N/A	
1,3-dichlorobenzene		n	None		N/A	2600		0.0000	N/A	N/A	N/A	N/A	N/A	
1,4-dichlorobenzene		n	None		N/A	2600		0.0000	N/A	N/A	N/A	N/A	N/A	
2-Chlorophenol		n	None		N/A	400		0.0000	N/A	N/A	N/A	N/A	N/A	
2,4-dichlorophenol		n	None		N/A	790		0.0000	N/A	N/A	N/A	N/A	N/A	
2,4-dichlorophenoxy acetic acid		n	None		N/A	None		0.0000	N/A	N/A	N/A	N/A	N/A	
2,4-dimethylphenol		n	None		N/A	2300		0.0000	N/A	N/A	N/A	N/A	N/A	
2,4-dinitrotoluene	C	n	None		N/A	91		0.0000	N/A	N/A	N/A	N/A	N/A	
2,4,6-Trichlorophenol	C	n	None		N/A	65		0.0000	N/A	N/A	N/A	N/A	N/A	
Acenaphthene		n	None		N/A	2700		0.0000	N/A	N/A	N/A	N/A	N/A	
Aldrin	C	n	3		N/A	0.0014		0.7500	N/A	N/A	7.80	N/A	N/A	
Anthracene		n	None		N/A	110000		0.0000	N/A	N/A	N/A	N/A	N/A	
Antimony		n	None		N/A	4300		0.0000	N/A	N/A	N/A	N/A	N/A	
Arsenic-3		n	360		N/A	None		90.0000	N/A	N/A	936.00	N/A	N/A	
Barium		n	None		N/A	None		0.0000	N/A	N/A	N/A	N/A	N/A	
Benzene	C	n	530		N/A	710		132.5000	N/A	N/A	1378.00	N/A	N/A	
Benzo(a)anthracene	C	n	None		N/A	0.049		0.0000	N/A	N/A	N/A	N/A	N/A	
Benzo(a)pyrene	C	n	None		N/A	0.049		0.0000	N/A	N/A	N/A	N/A	N/A	
Benzo(b)fluoranthene	C	n	None		N/A	0.049		0.0000	N/A	N/A	N/A	N/A	N/A	
Benzo(k)fluoranthene	C	n	None		N/A	0.049		0.0000	N/A	N/A	N/A	N/A	N/A	
Bromoform	C	n	None		N/A	3600		0.0000	N/A	N/A	N/A	N/A	N/A	
Butyl benzyl phthalate		n	None		N/A	5200		0.0000	N/A	N/A	N/A	N/A	N/A	
Carbon Tetrachloride	C	n	None		N/A	45		0.0000	N/A	N/A	N/A	N/A	N/A	
Chlordane	C	n	2.4		N/A	0.0059		0.6000	N/A	N/A	6.24	N/A	N/A	
Chlorodibromomethane		n	None		N/A	57000		0.0000	N/A	N/A	N/A	N/A	N/A	
Chloroform	C	n	None		N/A	47000		0.0000	N/A	N/A	N/A	N/A	N/A	
Chlorpyrifos		n	0.083		N/A	None		0.0208	N/A	N/A	0.22	N/A	N/A	
Chrysene	C	n	None		N/A	0.049		0.0000	N/A	N/A	N/A	N/A	N/A	
Cyanide		n	22		N/A	215000		5.5000	N/A	N/A	57.20	N/A	N/A	
DDD	C	n	None		N/A	0.0084		0.0000	N/A	N/A	N/A	N/A	N/A	
DDE	C	n	None		N/A	0.0059		0.0000	N/A	N/A	N/A	N/A	N/A	
DDT	C	n	1.1		N/A	0.0059		0.2750	N/A	N/A	2.86	N/A	N/A	
Demeton		n	None		N/A	None		0.0000	N/A	N/A	N/A	N/A	N/A	
Di-2-ethylhexyl Phthalate	C	n	None		N/A	59		0.0000	N/A	N/A	N/A	N/A	N/A	
Dibenz(a,h)anthracene	C	n	None		N/A	0.049		0.0000	N/A	N/A	N/A	N/A	N/A	
Dibutyl phthalate		n	None		N/A	12000		0.0000	N/A	N/A	N/A	N/A	N/A	
Dichlorobromomethane	C	n	None		N/A	460		0.0000	N/A	N/A	N/A	N/A	N/A	
Dichloromethane	C	n	None		N/A	16000		0.0000	N/A	N/A	N/A	N/A	N/A	
Dieldrin		n	2.5		N/A	0.00014		0.6250	N/A	N/A	6.50	N/A	N/A	

Diethyl phthalate		n	None		N/A		120000			0.0000	N/A		N/A	N/A		N/A	N/A
Dioxin		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Dissolved Oxygen		n	4		N/A		None			1.0000	N/A		N/A	10.40		N/A	N/A
Endosulfan		n	0.22		N/A		240			0.0550	N/A		N/A	0.57		N/A	N/A
Endrin		n	0.18		N/A		0.81			0.0450	N/A		N/A	0.47		N/A	N/A
Ethylbenzene		n	3200		N/A		29000			800.0000	N/A		N/A	8320.00		N/A	N/A
Fluoranthene		n	None		N/A		370			0.0000	N/A		N/A	N/A		N/A	N/A
Fluorene		n	None		N/A		14000			0.0000	N/A		N/A	N/A		N/A	N/A
Foaming Agents (MBAS)		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N
Guthion		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N
Heptachlor	C	n	0.52		N/A		0.0021			0.1300	N/A		N/A	1.35		N/A	N/A
Hexachlorocyclohexane		n	2		N/A		25			0.5000	N/A		N/A	5.20		N/A	N/A
Hydrogen Sulfide		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Indeno(1,2,3-cd)pyrene	C	n	None		N/A		0.049			0.0000	N/A		N/A	N/A		N/A	N/A
Isophorone		n	None		N/A		490000			0.0000	N/A		N/A	N/A		N/A	N/A
Kepone		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Lindane		n	2		N/A		25			0.5000	N/A		N/A	5.20		N/A	N/A
Malathion		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Methoxychlor		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Mirex		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Monochlorobenzene		n	None		N/A		21000			0.0000	N/A		N/A	N/A		N/A	N/A
Nitrate(as N)		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Nitrobenzene		n	None		N/A		1900			0.0000	N/A		N/A	N/A		N/A	N/A
Parathion		n	0.065		N/A		None			0.0163	N/A		N/A	0.17		N/A	N/A
PCBs(7 species)	C	n	None		N/A		0.00045			0.0000	N/A		N/A	N/A		N/A	N/A
Pentachlorophenol		n	0.06		N/A		82			0.0151	N/A		N/A	0.16		N/A	N/A
pH		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Phenol		n	None		N/A		4600000			0.0000	N/A		N/A	N/A		N/A	N/A
Phosphorus(elemental)		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Pyrene		n	None		N/A		11000			0.0000	N/A		N/A	N/A		N/A	N/A
Radioactivity		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Silvex		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Sulfate		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	N/A
Temperature		n	32		N/A		None			8.0000	N/A		N/A	83.20		N/A	N/A
Tetrachloroethylene		n	None		N/A		3500			0.0000	N/A		N/A	N/A		N/A	
Total dissolved solids		n	None		N/A		None			0.0000	N/A		N/A	N/A		N/A	
Toxaphene	C	n	0.73		N/A		0.0075			0.1825	N/A		N/A	1.90		N/A	N/A
Tributyltin		n	0.46		N/A		None			0.1150	N/A		N/A	1.20		N/A	N/A
Trichloroethylene	C	n	None		N/A		810			0.0000	N/A		N/A	N/A		N/A	N/A
Vinyl Chloride		n	None		N/A		5300			0.0000	N/A		N/A	N/A		N/A	N/A

Footnotes:

1. All concentrations expressed as micrograms per liter (ug/L),except Ammonia.
2. Ammonia (as mg/L) selected from separate tables,based on pH and temprature.
3. Acute-1 hour avg. concentration not to be exceeded more than 1/3years
4. Chronic-4 day avg.concentration not to be exceeded more than 1/3years.
5. Complete mix-mass balances employ 30Q5 for Non-carcinogens, and Harmonic Mean for Carcinogens
6. All flow values are expressed as Million Gallons per Day.
8. Metals measured as Dissolved, unless specified otherwise.
9. (c)-indicates carcinogenic parameter.
10. Public Water Supply-protects for fish and water consumption.
11. Other Waters-protects for fish consumption only.
12. Hardness expressed as CaCO3 (mg/L).
13. All limitations are based on EPA's TSD Statistical approach.

Freshwater Ammonia Toxicity Standards (based on 9 VAC 25-260-00 et seq)
(OK as of 3/91)
I. Perform Mass Balance for final Ammonia Concentrations and pH:

	Flow (MGD)	Total NH3-N (mg/L)	pH* SU	Temp. (C)	[H+]
Stream:	9.400	0.000	7.50	22.2	3.16E-08
POTW:	1.000	119.550	8.00	26.0	1.00E-08
Mix:	10.400	11.495	7.53	22.6	2.95E-08

Chronic/Acute Std.? (C/A)--> a <--- = 11.495 mg/l

System MEETS WQ Standard for 1-hour acute ammonia toxicity

* The pH mix does not take into account alkalinity.

	Acute (1-Hr)
90th Percentile Temp., C:	22.6
90th Percentile pH:	7.53
FT (final temperature):	0.8376
FPH	1.3937
RATIO	NA
pKa	9.32
Un-ionized Ammonia, mg/L as NH3:	0.22
Fraction of Un-ionized Ammonia:	0.0159
Total Ammonia, mg/L as NH3:	13.98
Total Ammonia, mg/L as N:	11.50
Standard Selected	11.495

Freshwater Ammonia Toxicity Standards (based on 9 VAC 25-260-00 et seq)
(OK as of 3/91)
I. Perform Mass Balance for final Ammonia Concentrations and pH:

	Flow (MGD)	Total NH3-N (mg/L)	pH* SU	Temp. (C)	[H+]
Stream	7.420	0.000	7.50	22.2	3.16E-08
POTW:	1.000	17.306	8.00	26.0	1.00E-08
Mix:	8.420	2.055	7.54	22.7	2.91E-08

Chronic/Acute Std.? (C/A)--> c <--- = 2.055 mg/l

System MEETS WQ Standard for 4-day chronic ammonia toxicity

* The pH mix does not take into account alkalinity.

	Chronic (4-Day)
90th Percentile Temp., C:	22.7
90th Percentile pH:	7.54
FT (final temperature):	0.832647
FPH	1.383858
RATIO	17.04671
pKa	9.3175
Un-ionized Ammonia, mg/L -NH3:	0.0407
Fraction of Un-ionized Ammonia:	0.01630
Total Ammonia, mg/L as NH3:	2.50
Total Ammonia, mg/L as N:	2.06
Standard Selected	2.055

WLA Analysis For: Ronile, Inc. ANTIDEGRADATION Date: 03/10/99

Spreadsheet for Chronic and Human Health AWLAs

Stream:	Pigg River	Effluent Information		Hardness:		Mix Hardness=	acute 5
Mean Hardness (mg/L) =	33	Mean Hardness=	58	acute	58		chronic 33.4953764
Stream NH3 (mg/L)	0	NH3 (mg/L)=		chronic	33.495376	* WLAa	
90% Temperature	22.2	90% Temp.=	26	7Q10 Ratio	50.466667	Coefficient =	0.99
90% pH	7.5	90% pH=	8	1Q10 Ratio	1	Acute IWC =	1
Fractional 7Q10-MGD	7.42	100% of 7Q10 Flow, MGD=	0.150			Chronic IWC =	0.0198150594
Fractional 1Q10-MGD	N/A			Harmonic ratio:	222.73333		
Harmonic mean (carcinogen):	33.26			30Q5 ratio:	73.733333		
30Q5 Flow (Non-carcinogen):	10.91						
R(iver),L(ake) or S(torm):	R						
Trout Present? (Y/N)	n						
Public Water Supply(Y/N):	n						

			Aquatic Protection Freshwater Criteria				Human Health								
Parameter and Form	Carcinogen?	Sort? (Y/N)	Acute Criteria	Existing Quality at 1Q10	Chronic Criteria	Existing Quality at 7Q10	All Other Surface Water Criteria	Existing Quality for HH	Back-ground concentration	Acute Baseline	Chronic Baseline	Human Health Baseline	Acute AWLA	Chronic A WLA	Human Health A WLA
Ammonia (mg/l as N)		Y	N/A		2.054	0.11	None			0.0000	0.5961	0	N/A	30.08	N/A
Arsenic		Y	N/A		None		50			0.0000	0.0000	5	N/A	N/A	368.67
Cadmium		Y	N/A		0.48		None			0.0000	0.1201	0	N/A	6.06	N/A
Chloride		Y	N/A		230000	2050	None			0.0000	59037.5000	0	N/A	2979425.83	N/A
Chlorine		Y	N/A		11		None			0.0000	2.7500	0	N/A	138.78	N/A
Copper		Y	N/A		4.64	0.12	None			0.0000	1.2509	0	N/A	63.13	N/A
Cr III		Y	N/A		84.51	8.00	None		8.00	8.0000	27.1269	0	N/A	1369.01	N/A
Cr-hex		Y	N/A		11		None			0.0000	2.7500	0	N/A	138.78	N/A
Iron		Y	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Lead		Y	N/A		3.36	0.06	None			0.0000	0.8842	0	N/A	44.62	N/A
Manganese		Y	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Mercury		Y	N/A		0.012		0.053			0.0000	0.0030	0.0053	N/A	0.15	0..
Nickel		Y	N/A		8.06		4600			0.0000	2.0145	460	N/A	101.66	33917.3
Selenium		Y	N/A		5		11000			0.0000	1.2500	1100	N/A	63.08	81106.67
Silver		Y	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Toluene		Y	N/A		175	0.23	200000	0.20		0.0000	43.9225	20000.18	N/A	2216.62	1474679.94
Xylenes, Total		Y	N/A		74	0.2				0.0000	18.6500	0	N/A	941.20	N/A
Zinc		Y	N/A		41.96	0.39	None			0.0000	10.7814	0	N/A	544.10	N/A
1,1-dichloroethylene		n	N/A		None		17000			0.0000	0.0000	1700	N/A	N/A	378646.67
1,2-dichlorobenzene		n	N/A		None		17000			0.0000	0.0000	1700	N/A	N/A	125346.67

1,2-dichloroethane	C	n	N/A		None		990			0.0000	0.0000	99	N/A	N/A	22050.60
1,2,4-trichlorobenzene		n	N/A		None		950			0.0000	0.0000	95	N/A	N/A	21159.67
1,3-dichlorobenzene		n	N/A		None		2600			0.0000	0.0000	260	N/A	N/A	19170.67
1,4-dichlorobenzene		n	N/A		None		2600			0.0000	0.0000	260	N/A	N/A	19170.67
2-Chlorophenol		n	N/A		None		400			0.0000	0.0000	40	N/A	N/A	8909.3
2,4-dichlorophenol		n	N/A		None		790			0.0000	0.0000	79	N/A	N/A	17595.93
2,4-dichlorophenoxy acetic acid		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
2,4-dimethylphenol		n	N/A		None		2300			0.0000	0.0000	230	N/A	N/A	51228.67
2,4-dinitrotoluene	C	n	N/A		None		91			0.0000	0.0000	9.1	N/A	N/A	2026.87
2,4,6-Trichlorophenol	C	n	N/A		None		65			0.0000	0.0000	6.5	N/A	N/A	1447.77
Acenaphthene		n	N/A		None		2700			0.0000	0.0000	270	N/A	N/A	60138.00
Aldrin	C	n	N/A		0.3		0.0014			0.0000	0.0750	0.00014	N/A	3.79	0.03
Anthracene		n	N/A		None		110000			0.0000	0.0000	11000	N/A	N/A	811066.67
Antimony		n	N/A		None		4300			0.0000	0.0000	430	N/A	N/A	95775.33
Arsenic-3		n	N/A		190		None			0.0000	47.5000	0	N/A	2397.17	N/A
Barium		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Benzene	C	n	N/A		53		710			0.0000	13.2500	71	N/A	668.68	15814.07
Benzo(a)anthracene	C	n	N/A		None		0.049			0.0000	0.0000	0.0049	N/A	N/A	1.09
Benzo(a)pyrene	C	n	N/A		None		0.049			0.0000	0.0000	0.0049	N/A	N/A	1.09
Benzo(b)fluoranthene	C	n	N/A		None		0.049			0.0000	0.0000	0.0049	N/A	N/A	1.09
Benzo(k)fluoranthene	C	n	N/A		None		0.049			0.0000	0.0000	0.0049	N/A	N/A	1.09
Bromoform	C	n	N/A		None		3600			0.0000	0.0000	360	N/A	N/A	80184.00
Butyl benzyl phthalate		n	N/A		None		5200			0.0000	0.0000	520	N/A	N/A	115821.33
Carbon Tetrachloride	C	n	N/A		None		45			0.0000	0.0000	4.5	N/A	N/A	1002.30
Chlordane	C	n	N/A		0.0043		0.0059			0.0000	0.0011	0.00059	N/A	0.05	0.13
Chlorodibromomethane		n	N/A		None		57000			0.0000	0.0000	5700	N/A	N/A	420280.00
Chloroform	C	n	N/A		None		47000			0.0000	0.0000	4700	N/A	N/A	1046846.67
Chlorpyrifos		n	N/A		0.041		None			0.0000	0.0103	0	N/A	0.52	N/A
Chrysene	C	n	N/A		None		0.049			0.0000	0.0000	0.0049	N/A	N/A	1.09
Cyanide		n	N/A		5.2		215000			0.0000	1.3000	21500	N/A	65.61	1585266.67
DDD	C	n	N/A		None		0.0084			0.0000	0.0000	0.00084	N/A	N/A	0.0
DDE	C	n	N/A		None		0.0059			0.0000	0.0000	0.00059	N/A	N/A	0.0
DDT	C	n	N/A		0.001		0.0059			0.0000	0.0003	0.00059	N/A	0.01	0.13
Demeton		n	N/A		0.1		None			0.0000	0.0250	0	N/A	1.26	N/A
Di-2-ethylhexyl Phthalate	C	n	N/A		None		59			0.0000	0.0000	5.9	N/A	N/A	1314.13
Dibenz(a,h)anthracene	C	n	N/A		None		0.049			0.0000	0.0000	0.0049	N/A	N/A	1.09
Dibutyl phthalate		n	N/A		None		12000			0.0000	0.0000	1200	N/A	N/A	267280.00
Dichlorobromomethane	C	n	N/A		None		460			0.0000	0.0000	46	N/A	N/A	10245.73
Dichloromethane	C	n	N/A		None		16000			0.0000	0.0000	1600	N/A	N/A	356373.33
Dieldrin		n	N/A		0.0019		0.00014			0.0000	0.0005	0.000014	N/A	0.02	0.00

Diethyl phthalate		n	N/A		None		120000			0.0000	0.0000	12000	N/A	N/A	2672800.00
Dioxin		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Dissolved Oxygen		n	N/A		5		None			0.0000	1.2500	0	N/A	63.08	N/A
Endosulfan		n	N/A		0.056		240			0.0000	0.0140	24	N/A	0.71	1769.60
Endrin		n	N/A		0.0023		0.81			0.0000	0.0006	0.081	N/A	0.03	5.97
Ethylbenzene		n	N/A		320		29000			0.0000	80.0000	2900	N/A	4037.33	213826.67
Fluoranthene		n	N/A		None		370			0.0000	0.0000	37	N/A	N/A	2728.13
Fluorene		n	N/A		None		14000			0.0000	0.0000	1400	N/A	N/A	103226.67
Foaming Agents (MBAS)		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/
Guthion		n	N/A		0.01		None			0.0000	0.0025	0	N/A	0.13	N/
Heptachlor	C	n	N/A		0.0038		0.0021			0.0000	0.0010	0.00021	N/A	0.05	0.05
Hexachlorocyclohexane		n	N/A		0.08		25			0.0000	0.0200		N/A		
Hydrogen Sulfide		n	N/A		2		None			0.0000	0.5000	0	N/A	25.23	N/A
Indeno(1,2,3-cd)pyrene	C	n	N/A		None		0.049			0.0000	0.0000	0.0049	N/A	N/A	1.09
Isophorone		n	N/A		None		490000			0.0000	0.0000	49000	N/A	N/A	3612933.33
Kepone		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Lindane		n	N/A		0.08		25			0.0000	0.0200	2.5	N/A	1.01	184.33
Malathion		n	N/A		0.1		None			0.0000	0.0250	0	N/A	1.26	N/A
Methoxychlor		n	N/A		0.03		None			0.0000	0.0075	0	N/A	0.38	N/A
Mirex		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Monochlorobenzene		n	N/A		None		21000			0.0000	0.0000	2100	N/A	N/A	154840.00
Nitrate(as N)		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Nitrobenzene		n	N/A		None		1900			0.0000	0.0000	190	N/A	N/A	42319.33
Parathion		n	N/A		0.013		None			0.0000	0.0033	0	N/A	0.16	N/A
PCBs(7 species)	C	n	N/A		None		0.00045			0.0000	0.0000	0.000045	N/A	N/A	0.01
Pentachlorophenol		n	N/A		0.04		82			0.0000	0.0095	8.2	N/A	0.48	604.61
pH		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Phenol		n	N/A		None		4600000			0.0000	0.0000	460000	N/A	N/A	33917333.33
Phosphorus(elemental)		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Pyrene		n	N/A		None		11000			0.0000	0.0000	1100	N/A	N/A	81106.67
Radioactivity		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Silvex		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Sulfate		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/A
Temperature		n	N/A		32		None			0.0000	8.0000	0	N/A	403.73	N/A
Tetrachloroethylene		n	N/A		None		3500			0.0000	0.0000	350	N/A	N/A	25806.67
Total dissolved solids		n	N/A		None		None			0.0000	0.0000	0	N/A	N/A	N/
Toxaphene	C	n	N/A		0.0002		0.0075			0.0000	0.0001	0.00075	N/A	0.00	0.17
Tributyltin		n	N/A		0.026		None			0.0000	0.0065	0	N/A	0.33	N/A
Trichloroethylene	C	n	N/A		None		810			0.0000	0.0000	81	N/A	N/A	18041.40
Vinyl Chloride		n	N/A		None		5300			0.0000	0.0000	530	N/A	N/A	118048.67

Footnotes:

1. All concentrations expressed as micrograms per liter (ug/L),except Ammonia.
2. Ammonia (as mg/L) selected from separate tables,based on pH and temprature.
3. Acute-1 hour avg. concentration not to be exceeded more than 1/3years
4. Chronic-4 day avg.concentration not to be exceeded more than 1/3years.
5. Complete mix-mass balances employ 30Q5 for Non-carcinogens, and Harmonic Mean for Carcinogens
6. All flow values are expressed as Million Gallons per Day.
8. Metals measured as Dissolved, unless specified otherwise.
9. (c)-indicates carcinogenic parameter.
10. Public Water Supply-protects for fish and water consumption.
11. Other Waters-protects for fish consumption only.
12. Hardness expressed as CaCO3 (mg/L).
13. All limitations are based on EPA's TSD Statistical approach.

Freshwater Ammonia Toxicity Standards (based on 9 VAC 25-260-00 et seq)
(OK as of 3/91)
I. Perform Mass Balance for final Ammonia Concentrations and pH:

	Flow (MGD)	Total NH3-N (mg/L)	pH* SU	Temp. (C)	[H+]
Stream:	N/A	0.000	7.50	22.2	3.16E-08
POTW:	0.150	5.624	8.00	26.0	1.00E-08
Mix:	0.150	5.624	8.00	26.0	1.00E-08

Chronic/Acute Std.? (C/A)--> a <--- = 5.624 mg/l

System MEETS WQ Standard for 1-hour acute ammonia toxicity

* The pH mix does not take into account alkalinity.

	Acute (1-Hr)
90th Percentile Temp., C:	26.0
90th Percentile pH:	8.00
FT (final temperature):	0.6607
FPH	1
RATIO	NA
pKa	9.21
Un-ionized Ammonia, mg/L as NH3:	0.39
Fraction of Un-ionized Ammonia:	0.0575
Total Ammonia, mg/L as NH3:	6.84
Total Ammonia, mg/L as N:	5.62
Standard Selected	5.624

Freshwater Ammonia Toxicity Standards (based on 9 VAC 25-260-00 et seq)
(OK as of 3/91)
I. Perform Mass Balance for final Ammonia Concentrations and pH:

	Flow (MGD)	Total NH3-N (mg/L)	pH* SU	Temp. (C)	[H+]
Stream	7.420	0.000	7.50	22.2	3.16E-08
POTW:	0.150	103.676	8.00	26.0	1.00E-08
Mix:	7.570	2.054	7.51	22.3	3.12E-08

Chronic/Acute Std.? (C/A)--> c <--- = 2.054 mg/l

System MEETS WQ Standard for 4-day chronic ammonia toxicity

* The pH mix does not take into account alkalinity.

	Chronic (4-Day)
90th Percentile Temp., C:	22.3
90th Percentile pH:	7.51
FT (final temperature):	0.854557
FPH	1.426853
RATIO	17.75053
pKa	9.3293
Un-ionized Ammonia, mg/L -NH3:	0.0370
Fraction of Un-ionized Ammonia:	0.01480
Total Ammonia, mg/L as NH3:	2.50
Total Ammonia, mg/L as N:	2.05
Standard Selected	2.054

APPENDIX E

TMDL documentation

		Development					
27.	Falling River	Roanoke River PCB TMDL Development	Appomattox, Campbell	L32R	tPCB	0.0	MG/YR
28.	Childrey Creek	Roanoke River PCB TMDL Development	Halifax	L30R	tPCB	0.0	MG/YR
29.	Catawba Creek	Roanoke River PCB TMDL Development	Halifax	L36R	tPCB	0.0	MG/YR
30.	Turnip Creek	Roanoke River PCB TMDL Development	Charlotte	L36R	tPCB	0.0	MG/YR
31.	Hunting Creek	Roanoke River PCB TMDL Development	Halifax	L38R	tPCB	0.0	MG/YR
32.	Cub Creek	Roanoke River PCB TMDL Development	Appomattox, Charlotte	L37R	tPCB	0.0	MG/YR
33.	Black Walnut Creek	Roanoke River PCB TMDL Development	Halifax	L38R	tPCB	0.8	MG/YR
34.	Roanoke Creek	Roanoke River PCB TMDL Development	Charlotte	L39R	tPCB	0.0	MG/YR
35.	Difficult Creek	Roanoke River PCB TMDL Development	Halifax	L41R	tPCB	0.0	MG/YR
36.	Roanoke River	Roanoke River PCB TMDL Development	Appomattox, Campbell, Charlotte, Pittsylvania, Halifax	L19R	tPCB	1,931.8	MG/YR

B. Non-TMDL waste load allocations.

Water Body	Permit No.	Facility Name	Outfall No.	Receiving Stream	River Mile	Parameter Description	WLA	Units WLA
VAW-L04R	VA0072389	Oak Ridge Mobile Home Park	001	Falling Creek UT	0.32	BOD_5	0.85	KG/D
VAW-L04R	VA0025020	Roanoke City Regional Water Pollution Control Plant	001	Roanoke River	201.81	BOD_5	1173	KG/D
						TKN, APR-SEP	318	KG/D
						TKN, OCT-MAR	636	KG/D
			001	Roanoke River	201.81	BOD_5	1173	KG/D
						TKN, APR-SEP	416	KG/D
						TKN, OCT-MAR	832	KG/D

			001	Roanoke River	201.81	BOD_5 TKN, APR-SEP TKN, OCT-MAR	1173 469 939	KG/D KG/D KG/D
VAW-L04R	VA0077895	Roanoke Moose Lodge	001	Mason Creek	7.79	BOD_5, JUN-SEP TKN, JUN-SEP	0.24 0.09	KG/D KG/D
VAW-L07R	VA0020842	Bedford County School Board-Stewartsville Elementary School	001	Nat Branch, UT	0.59	BOD_5	0.5	KG/D
VAW-L14R	VA0029254	Ferrum Water and Sewage Auth. - Ferrum Sewage Treatment Plant	001	Storey Creek	9.78	BOD_5	14.2	KG/D
VAW-L14R	VA0085952	Rocky Mount Town Sewage Treatment Plant	001	Pigg River	52	BOD_5	133	KG/D
VAW-L14R	VA0076015	Ronile Incorporated	001	Pigg River	57.24	BOD_5	14.8	KG/D
VAW-L21R	VA0063738	Bedford County School Board - Staunton River High School	001	Shoulder Run, UT	0.95	BOD_5	1.8	KG/D
VAW-L21R	VA0020869	Bedford County School Board - Thaxton Elementary School	001	Wolf Creek, UT	0.35	BOD_5	0.31	KG/D
VAW-L22R	VA0023515	Blue Ridge Regional Jail Auth. - Moneta Adult Detention Facility STP	001	Mattox Creek, UT	3.76	BOD_5	1.66	KG/D
VAW-L25R	VA0020851	Bedford County School Board - Otter River	001	Big Otter River, UT	1.15	BOD_5	0.4	KG/D