Attachment A

Flow Frequency Determination Memorandum

and Ambient Monitoring Data

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
4949-A Cox Road Glen Allen, Virginia 23060

SUBJECT: Flow Frequency Determination / 303(d) Status
Skippers WWTF – VA0028916

TO: Tamira Cohen, Ph.D.

FROM: Jennifer Palmore, P.G.

DATE: April 9, 2013

COPIES: File

The Greensville County Water and Sewer Authority's Skippers Wastewater Treatment Facility discharges to Fontaine Creek (a.k.a. Fountains Creek). The discharge is located at the Route 629 bridge at rivermile 5AFON022.00. Flow frequencies have been requested at this site for use in developing effluent limitations for the VPDES permit.

Flow frequencies were developed based on a drainage area comparison between the discharge point and the USGS continuous record gage on Fountains Creek near Brink, VA (#02052500), which is located at the Route 603 bridge approximately 16 miles upstream of the discharge point.

Fountains Creek near Brink, VA (#02052500):
Statistical period = 1953 to 1996
Drainage Area = 65.2 mi^2

1Q30 = 0.00 cfs	High Flow 1Q10 = 4.9 cfs
1Q10 = 0.00 cfs	High Flow 7Q10 = 5.9 cfs
7Q10 = 0.004 cfs	High Flow 30Q10 = 11 cfs
30Q10 = 0.04 cfs	HM = undefined
30Q5 = 0.17 cfs	

Fontaine Creek (a.k.a. Fountains Creek) at discharge point:
Drainage area = 106 mi^2

1Q30 = 0.00 cfs (0.00 MGD)	High Flow 1Q10 = 8.0 cfs (5.1 MGD)
1Q10 = 0.00 cfs (0.00 MGD)	High Flow 7Q10 = 9.6 cfs (6.2 MGD)
7Q10 = 0.007 cfs (0.004 MGD)	High Flow 30Q10 = 18 cfs (12 MGD)
30Q10 = 0.07 cfs (0.04 MGD)	HM = undefined
30Q5 = 0.28 cfs (0.18 MGD)	

The high flow months are December through April. The values at the discharge point were determined by drainage area proportions and do not address any withdrawals, discharges, or springs lying between the gage and the outfall.

During the 2010 305(b)/303(d) Integrated Water Quality Assessment, Fontaine Creek was assessed as a Category 2B water ("Waters are of concern to the state but no Water Quality Standard exists for a specific pollutant, or the water exceeds a state screening value or toxicity test.") The Aquatic Life and Wildlife Uses were fully supporting with observed effects due to elevated mirex. The Recreation and Fish Consumption Uses were fully supporting.

In the draft 2012 Assessment, the stream remained Category 2B. The Aquatic Life and Wildlife Uses were fully supporting with observed effects due to mirex. The Recreation Use was fully supporting and the Fish Consumption Use was not assessed.

The Skippers WWTF was addressed in the Fontaine Creek Bacterial TMDL, which was approved by the EPA on 1/13/2011 and by the SWCB on 8/4/2011. The facility received an E. coli wasteload allocation of 6.27E+11 cfu/year.

Water quality data from monitoring station 5AFON022.04 is attached. The station is located on the upstream side of the Route 629 bridge directly above the outfall.

The antidegradation policy was not applied during the 1989 permit modeling and the analysis allowed dissolved oxygen to drop to 5.0 mg/L, therefore the receiving stream should be considered a Tier 1 water.

If you have any questions concerning this analysis, please let me know.

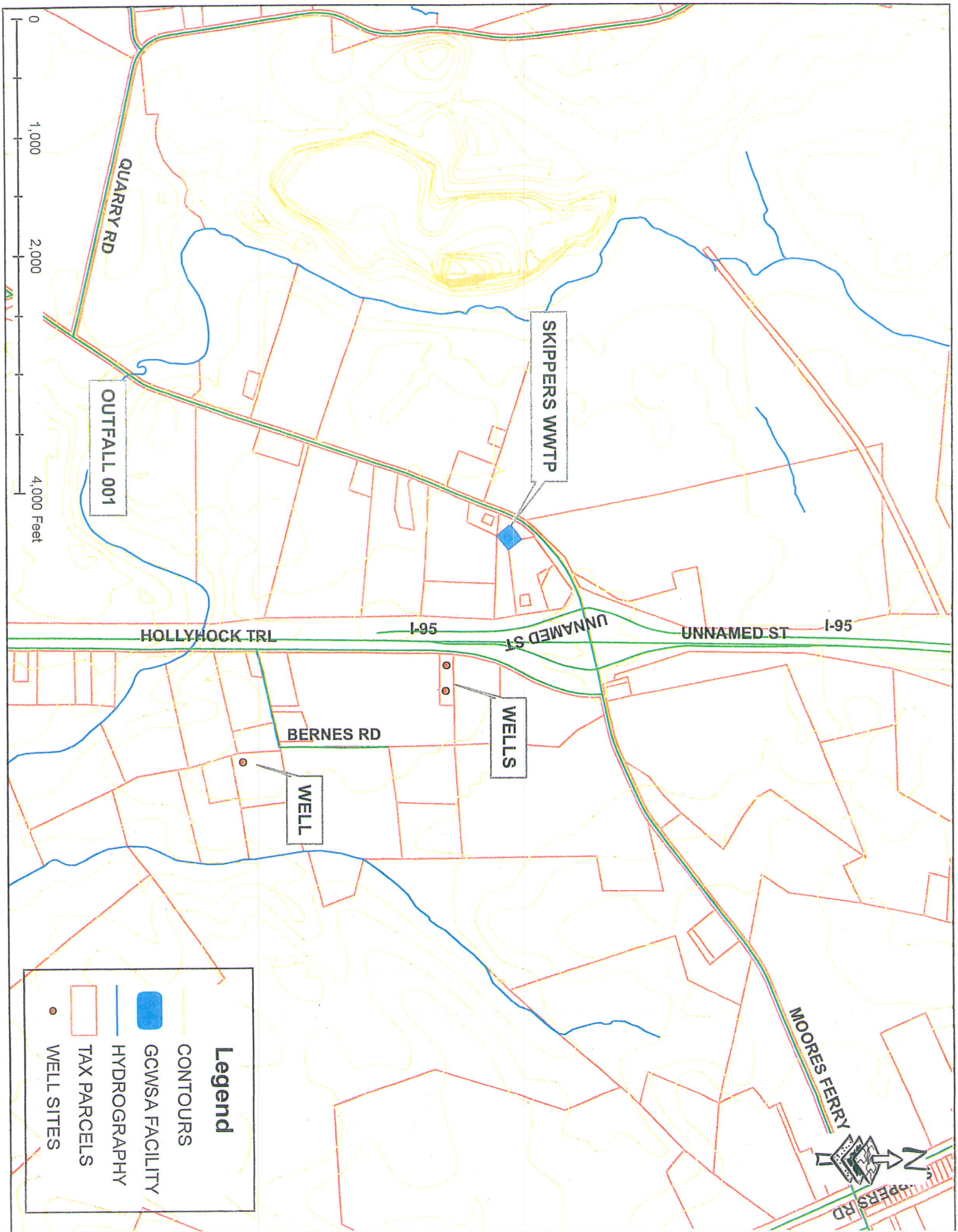
						00900	
						HARDNESS, TOTAL (MG/L AS CACO3)	
Sta Id	**Collection Date Time**	**Depth Des**	**Depth**	**Container**	**Comment**	**Value**	**Com Code**
5AFON022.04	08/13/1990 11:45	S	0.3	R	STORET DATA CONVERSION	28	
	11/27/1990 12:30	S	0.3	R	STORET DATA CONVERSION	34	
	02/12/1991 11:45	S	0.09	R	STORET DATA CONVERSION	22	
	05/23/1991 11:45	S	0.3	R	STORET DATA CONVERSION	24	
	08/20/1991 11:10	S	0.3	R	STORET DATA CONVERSION	36	
	11/25/1991 10:53	S	0.3	R	STORET DATA CONVERSION	36	
	02/25/1992 10:20	S	0.3	R	STORET DATA CONVERSION	32	
	05/20/1992 10:45	S	0.3	R	STORET DATA CONVERSION	24	
	08/20/1992 11:21	S	0.3	R	STORET DATA CONVERSION	28	
	11/12/1992 11:00	S	0.3	R	STORET DATA CONVERSION	28	
	02/17/1993 11:46	S	0.3	R	STORET DATA CONVERSION	18	
	05/17/1993 11:25	S	0.3	R	STORET DATA CONVERSION	30	
	08/11/1993 11:00	S	0.3	R	STORET DATA CONVERSION	46	
	11/15/1993 11:51	S	0.3	R	STORET DATA CONVERSION	84	
	02/16/1994 12:55	S	0.3	R	STORET DATA CONVERSION	12	
	05/12/1994 10:55	S	0.3	R	STORET DATA CONVERSION	38	
	08/04/1994 15:00	S	0.3	R	STORET DATA CONVERSION	41	
	11/03/1994 12:24	S	0.3	R	STORET DATA CONVERSION	42	
	02/21/1995 13:44	S	0.3	R	STORET DATA CONVERSION	13	
	05/08/1995 12:00	S	0.3	R	STORET DATA CONVERSION	22	
	08/03/1995 14:33	S	0.3	R	STORET DATA CONVERSION	68	
	11/06/1995 11:45	S	0.3	R	STORET DATA CONVERSION	34	
	02/14/1996 12:00	S	0.3	R	STORET DATA CONVERSION	16	
	05/15/1996 13:55	S	0.3	R	STORET DATA CONVERSION	22	
	08/14/1996 12:30	S	0.3	R	STORET DATA CONVERSION	23	
	11/21/1996 12:00	S	0.3	R	STORET DATA CONVERSION	35	
	02/11/1997 10:45	S	0.3	R	STORET DATA CONVERSION	22.3	
	05/22/1997 12:26	S	0.3	R	STORET DATA CONVERSION	27.3	
	07/16/1997 13:20	S	0.3	R	STORET DATA CONVERSION	99.7	
	09/18/1997 15:50	S	0.3	R	STORET DATA CONVERSION	168	
	11/13/1997 15:00	S	0.3	R	STORET DATA CONVERSION	31.9	
	01/13/1998 14:30	S	0.3	R	STORET DATA CONVERSION	21.4	
	03/09/1998 15:00	S	0.3	R	STORET DATA CONVERSION	25.2	
	05/21/1998 15:00	S	0.3	R	STORET DATA CONVERSION	23	
	07/23/1998 11:15	S	0.3	R	STORET DATA CONVERSION	45	
	09/29/1998 12:44	S	0.3	R	STORET DATA CONVERSION	288	
	11/30/1998 13:30	S	0.3	R	STORET DATA CONVERSION	77	
	01/20/1999 13:15	S	0.3	R		18	
	03/29/1999 15:00	S	0.3	R		36	
	05/24/1999 15:00	S	0.3	R		46	
	07/13/1999 12:46	S	0.3	R		21.7	
	09/02/1999 15:00	S	0.3	R		242	
	11/08/1999 13:05	S	0.3	R		19	
	01/12/2000 16:00	S	0.3	R		21.6	
	03/20/2000 14:35	S	0.3	R		18	
Average						**46**	

Annual (Jan-Dec)									HIGH FLOW (DEC-APR)
Station ID	**Collection Date**	**Depth Desc**	**Depth**	**Temp Celcius**	**Field Ph**	**Do Probe**	**Do Winkler**	**Fdt Do Optical**	**Temp Celsius**
5AFON022.04	8/13/1990	S	0.3	2.37	7.7		7.3		
5AFON022.04	11/27/1990	S	0.3	9.8	6.73	9.83	9.8		
5AFON022.04	2/12/1991	S	0.09	5.88	7.87	12.55	12.6		5.88
5AFON022.04	5/23/1991	S	0.3	20.42	7.19		7.8		
5AFON022.04	8/20/1991	S	0.3	24.53	6.61	6.28			
5AFON022.04	11/25/1991	S	0.3	10.9	6.66	9.47			
5AFON022.04	2/25/1992	S	0.3	10.04	6.65	11.07			10.04
5AFON022.04	5/20/1992	S	0.3	18	6.16	7.87			
5AFON022.04	8/20/1992	S	0.3	21.87	6.09	7.64			
5AFON022.04	11/12/1992	S	0.3	10.15	6.76	10.01			
5AFON022.04	2/17/1993	S	0.3	6.59	6.43	12.26			6.59
5AFON022.04	5/17/1993	S	0.3	20.65	6.51	7.67			
5AFON022.04	8/11/1993	S	0.3	22.75	6.5	6.47			
5AFON022.04	11/15/1993	S	0.3	13.84	6.92	7.65			
5AFON022.04	2/16/1994	S	0.3	4.93	6.23	11.97			4.93
5AFON022.04	5/12/1994	S	0.3	17.56	6.6	8.38			
5AFON022.04	8/4/1994	S	0.3	25.82	6.74	5.58			
5AFON022.04	11/3/1994	S	0.3	13.13	6.6	5.78			
5AFON022.04	2/21/1995	S	0.3	7.88	6.56	10.77			7.88
5AFON022.04	5/8/1995	S	0.3	15.74	6.77	8.87			
5AFON022.04	8/3/1995	S	0.3	26.87	6.99	5.6			
5AFON022.04	11/6/1995	S	0.3	10.88	6.56	8.32			
5AFON022.04	2/14/1996	S	0.3	4.66	6.11	11.62			4.66
5AFON022.04	5/15/1996	S	0.3	16.01	6.57	8.47			
5AFON022.04	8/14/1996	S	0.3	21.49	6.57	1.73			
5AFON022.04	11/21/1996	S	0.3	7.44	6.53	11.03			
5AFON022.04	2/11/1997	S	0.3	5.42	6.81	12.31			5.42
5AFON022.04	5/22/1997	S	0.3	18.88	6.68	8.35			
5AFON022.04	9/18/1997	S	0.3	21.99	7.46	8.52			
5AFON022.04	11/13/1997	S	0.3	9.64	6.79	9.17			
5AFON022.04	1/13/1998	S	0.3	8.98	6.7	10.65			8.98
5AFON022.04	3/9/1998	S	0.3	13.44	5.79	9.43			13.44
5AFON022.04	5/21/1998	S	0.3	20.95	6.82	7.81			
5AFON022.04	7/23/1998	S	0.3	26.48	6.95	5.62			
5AFON022.04	9/29/1998	S	0.3	21.6	7.14	5.38			
5AFON022.04	11/30/1998	S	0.3	11.27	6.84	7.73			
5AFON022.04	1/20/1999	S	0.3	7.86	5.96	10.87			7.86
5AFON022.04	3/29/1999	S	0.3	13	6.53	10.29			13
5AFON022.04	5/24/1999	S	0.3	21.11	6.74	7.34			
5AFON022.04	7/13/1999	S	0.3	21.29	6.73	5.72			
5AFON022.04	9/2/1999	S	0.3	21.28	7.34	8.3			
5AFON022.04	11/8/1999	S	0.3	11.01	6	8.52			
5AFON022.04	1/12/2000	S	0.3	9.72	6.22	10.4			9.72
5AFON022.04	3/20/2000	S	0.3	10.62	6.22	10.85			10.62
5AFON022.04	1/29/2007	S	0.3	4.8	6.6	12.1			4.8
5AFON022.04	2/21/2007	S	0.3	5.4	6.4	12.5			5.4
5AFON022.04	3/7/2007	S	0.3	8.3	6.8	11.5			8.3
5AFON022.04	4/3/2007	S	0.3	17.3	6.4	8.1			17.3
5AFON022.04	5/2/2007	S	0.3	20.5	6.4	7.2			
5AFON022.04	6/12/2007	S	0.3	22.5	6.6	6			
5AFON022.04	7/10/2007	S	0.3	24.7	7.4			7	
5AFON022.04	8/15/2007	S	0.3	24.1	6.9	4.4			
5AFON022.04	9/11/2007	S	0.3	23.2	7.4	6.3			
5AFON022.04	10/3/2007	S	0.3	19.2	7.1	6.1			
5AFON022.04	11/28/2007	S	0.3	10.5	6.8	6.6			
5AFON022.04	12/10/2007	S	0.3	10.6	7.2	7			10.6
5AFON022.04	1/2/2013	S	0.3	6.22	6.98	11.77			6.22
5AFON022.04	2/6/2013	S	0.3	6.38	6.96	12.04			6.38
5AFON022.04	3/12/2013	S	0.3	10.13	6.96	10.78			10.13
5AFON022.04	4/3/2013	S	0.3	11.12	7.12	9.53			11.12
90th Percentile				**23.3**	**7.2**				**12.8**
10th Percentile				**5.8**	**6.2**				**5.0**

Attachment B

Wastewater Treatment Facility Schematic

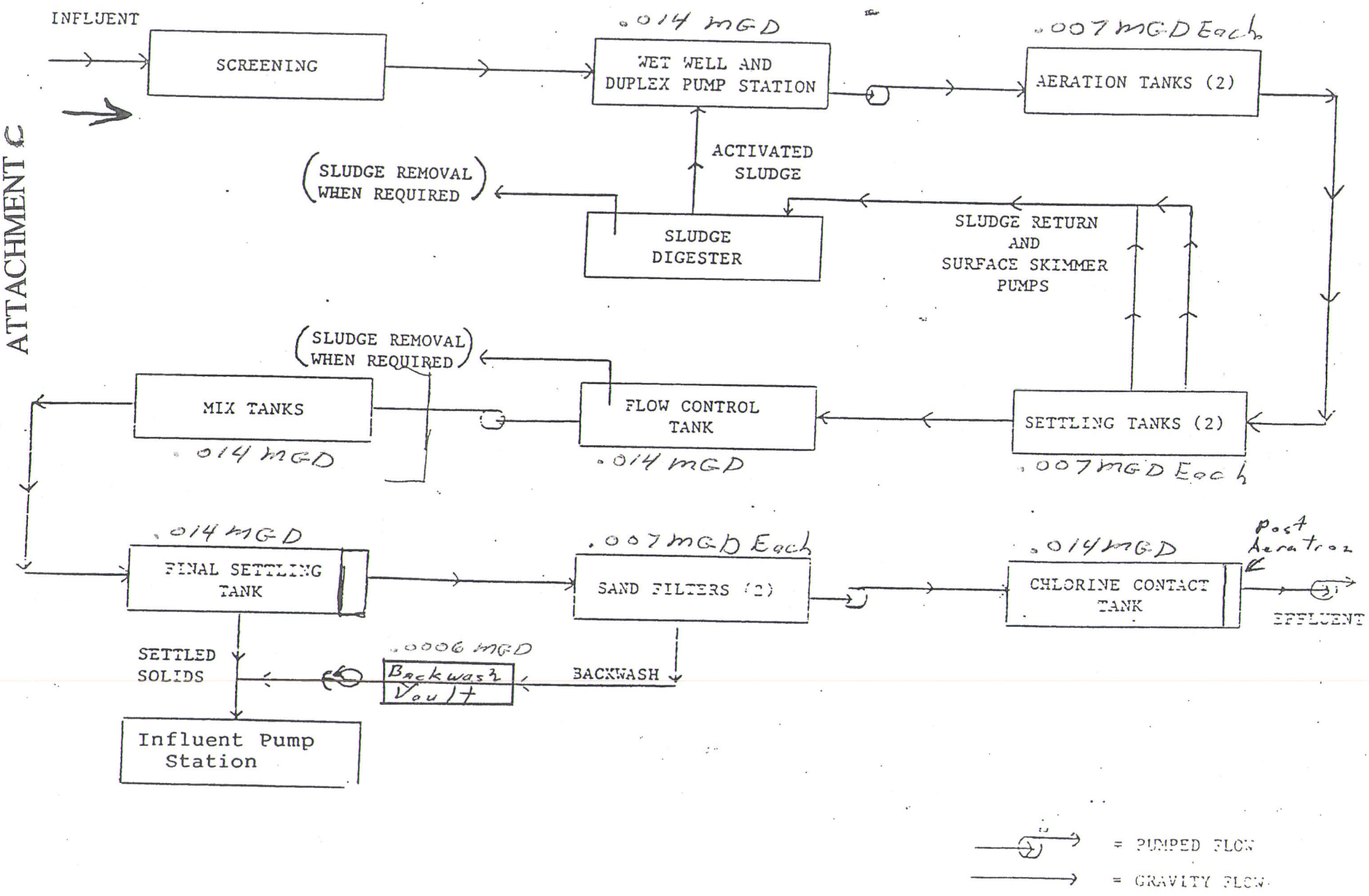
Attachment B



Attachment B-1

ATTACHMENT C

TERTIARY TREATMENT FLOW DIAGRAM



ATTACHMENT D

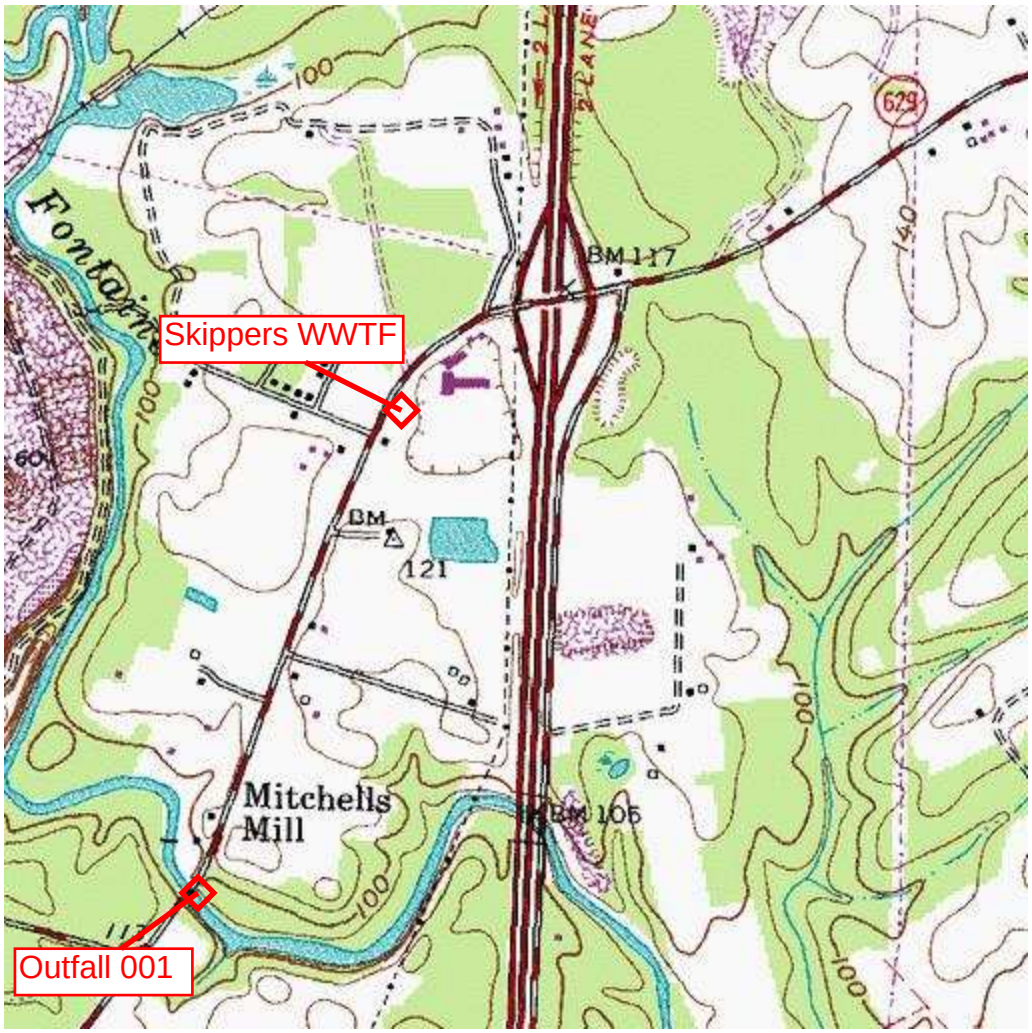
Form 2A Part B Item B.5 a Scheduled Improvements and Schedules of Implementation

We are in the process of replacing the original duplex influent pump station with a new station. Are also adding telescopic valves to the settling tanks to allow us to return the sludge from these tanks thru the pump station and send it back to the aeration tanks. The intention of this upgrade is to assist in better treatment of the wastewater and provide a better quality discharge.

With the addition of a second travel plaza discharging to this plant we wanted to be pro active in our treatment of the wastewater. The changes do not increase the capacity of the plant.
In discussions with DEQ personnel we were told that their review or a permitwere not needed.

Attachment C

Location Maps


Skippers WWTF
Outfall 001
Fontaine
Mitchells
Mill
BM 117
BM
121
BM 105
629
100
140
60

Attachment D

Site Inspection Report

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
WASTEWATER FACILITY INSPECTION REPORT

FACILITY NAME:	Skippers STP (Econo Lodge)	**INSPECTOR:**	Charles Stitzer
PERMIT No.:	VA0028916	**INSPECTION DATE:**	May 28, 2008
TYPE OF FACILITY:	Municipal, Small	**REPORT COMPLETED:**	June 6, 2008
COUNTY/CITY:	Greensville	**UNANNOUNCED INSPECTION:**	NO
REVIEWED BY:			
PRESENT DURING INSPECTION:	Wayne Gilliam		

I. OPERATIONAL UNIT REVIEW AND CONDITION:

Influent Bar Screen: Manually cleaned as needed.

Inflluent Lift Station: Wet well with two float switch controlled pumps that run simultaneously. One pump is run during low flow conditions. There is no high level alarm.

Activated Sludge Aeration Tanks (2): Wastewater is split evenly to two large above ground aeration tanks equipped with floating aerators. Aerators are on timers. Aeration timing is varied as conditions dictate. At time of inspection, wastewater in aeration tanks was dark and appeared to have a high MLSS (ready for wasting).

Clarifiers (2): Two tanks adjacent to the aeration tanks serve as clarifiers. Each receives wastewater from the adjacent aeration tank. Water in the clarifiers was clear with a light layer of scum, possibly indicating a need to waste from aeration tanks.

Sludge tank/Aerobic Digester (1): One tank receives sludge from the clarifiers. Sludge appeared normal. No foam.

Sand Filters (2): Following the Clarifiers, the partially treated wastewater is pumped to two sand filters. These sand filters are backwashed with water from the Chlorine Contact tank as needed (about every two to three weeks). Filter backwash is routed to the head of the plant. At the time of the inspection, one backwash pump was out of service and had been replaced with a temporary portable pump. This arrangement appeared to be working fine.

Chlorination: Sodium Hypochlorite is fed into the sand filter discharge line just prior to the Chlorine Contact Tank. The Chlorine Contact Tank is very large. The discharge from the tank is from the surface through a pipe that drops through the interior of the contact tank and out through the bottom side (some aeration is supposed to occur in this drop). At the point where the pipe leaves the bottom side of the Contact tank, there is a sample spigot.

Dechlorination: Sodium Sulfite tablets in a four-tube dispenser are used to dechlorinate.

Flow measuring: Totalizer

II. ULTIMATE DISPOSAL OF SOLIDS:

Solids are pumped from Sludge Tank/Aerobic Digester and transported to Three Creek STP.

III. FIELD DATA: (not obtained)

Flow:	Not meas. MGD	**Dissolved Oxygen:**	__mg/L	**Contact Chlorine Res.:**	___mg/L
PH:	Not meas.	**Final Chlorine Res.:**	__ mg/L	**Temperature:**	Not meas.

Calibration Time/Initials/documentation: NA

Condition of Effluent: Good

Condition of Receiving Stream: Good, Slightly muddy from recent rain.

Samples Collected during the inspection: BOD, TSS, Total Phosphorus, TKN, Nitrate, Nitrate, Ammonia

IV. PLANT OPERATIONS AND MAINTENANCE:

Operations and Maintenance Manual:	YES
Class and Number of Licensed Operators:	GWSA, Class I –2, Class II – 1, Class III – 3, Class IV – 1
Alarm Systems and Alternate Power:	N/A
Any bypassing since last inspection?	NO
When was the RPZ device last checked?	N/A
Name, number and description of pump stations:	Influent lift station

V. COMMENTS:

WWTP appears to be performing adequately with good attention from operators. However, the plant's tanks are beginning to deteriorate and will eventually need some cosmetic/preventative maintenance; sandblasting, painting, etc.

Items evaluated during this inspection include (check all that apply):

[X] Yes	[ ] No		Operational Units
[ ] Yes	[x] No		O & M Manual
[ ] Yes	[X] No		Maintenance Records
[ ] Yes	[ ] No	[X] N/A	Pathogen Reduction & Vector Attraction Reduction
[X] Yes	[ ] No	[ ] N/A	Sludge Disposal Plan
[ ] Yes	[ ] No	[X] N/A	Groundwater Monitoring Plan
[ ] Yes	[ ] No	[X] N/A	Storm Water Pollution Prevention Plan
[X] Yes	[ ] No	[ ] N/A	Permit Special Conditions
[ ] Yes	[X] No	[ ] N/A	Permit Water Quality Chemical Monitoring
[X] Yes	[ ] No	[ ] N/A	Laboratory Records (see Lab Report)

GENERAL RECOMMENDATIONS:

1. Continue long term housekeeping/site clean-up.
2. Plan for future cosmetic maintenance, particularly with regard to rust control.

VII. COMPLIANCE RECOMMENDATIONS/REQUEST FOR CORRECTIVE ACTION:

None

Attachment E

Facility Effluent Data Summary

	pH (s.u.)		BOD_5 (mg/L)				TSS (mg/L)				DO (mg/L)	NH_3 (mg/L)		TRC (mg/L)
Due Date	**Conc Min**	**Conc Max**	**Quant Avg**	**Quanti Max**	**Conc Avg**	**Conc Max**	**Quant Avg**	**Quanti Max**	**Conc Avg**	**Conc Max**	**Conc Max**	**Conc Avg**	**Conc Max**	**Conc Avg**
10-May-10	6.8	7.7	<QL	<QL	<QL	<QL	575	575	19	19	7.1	3	3	<QL
10-Jun-10	7	7.6									6.2	3.6	3.6	<QL
10-Jul-10	7.1	7.6									6	<QL	<QL	<QL
10-Aug-10	7	7.6									5.5	3.3	3.3	<QL
10-Sep-10	7	7.5									6	0.2	0.2	<QL
10-Oct-10	7	7.4									6.2	<QL	<QL	<QL
10-Nov-10	7.1	7.6	579	579	9	9	443	443	9	9	6.8	<QL	<QL	<QL
10-Dec-10	6.9	7.7									8.6			<QL
10-Jan-11	7.1	7.9									9.1			<QL
10-Feb-11	7.2	7.7									9.7			<QL
10-Mar-11	6.9	7.5									6.9			<QL
10-Apr-11	6.9	7.6									7.3			<QL
10-May-11	6.6	7.8	<QL	<QL	<QL	<QL	129	129	2	2	6.2	1.4	1.4	<QL
10-Jun-11	6.9	7.7									6	2.3	2.3	<QL
10-Jul-11	6.9	7.7									6.1	0.1	0.1	<QL
10-Aug-11	6.7	7.7									5.8	2.4	2.4	<QL
10-Sep-11	7	7.7									6.1	<QL	<QL	<QL
10-Oct-11	7	7.8									6.2	<QL	<QL	<QL
10-Nov-11	7.1	7.6	363	363	6	6	61	61	1	1	6.3			<QL
10-Dec-11	6.9	7.6									8.2			<QL
10-Jan-12	6.9	7.9									8.5			<QL
10-Feb-12	6.9	7.5									8.4			<QL
10-Mar-12	6.9	7.5									8.5			<QL
10-Apr-12	6.9	7.9									7.2			<QL
10-May-12	6.8	7.7	344	344	7	7	177	177	4	4	6.9	1	1	<QL
10-Jun-12	7	7.6									6.2	0.8	0.8	<QL
10-Jul-12	6.9	7.6									6.1	0.7	0.7	<QL
10-Aug-12	7.1	7.7									6	1.6	1.6	<QL
10-Sep-12	6.8	7.6									6.1	37.2	37.2	<QL
10-Oct-12	6.9	7.3									6	1.1	1.1	<QL
10-Nov-12	6.8	7.4	424	424	7	7	176	176	3	3	6.5	1.6	1.6	<QL
10-Dec-12	6.8	7.3									8.8	0.7	0.7	<QL
10-Jan-13	6.6	7.3									8.4			<QL
10-Feb-13	6.8	7.4									8.5			<QL
10-Mar-13	6.8	7.5									8.3			<QL
10-Apr-13	6.6	7.3									8.2			<QL
90th %	**7.1**	**7.8**	**502**	**502**	**8**	**8**	**509**	**509**	**14**	**14**	**8.6**	**3.30**	**3.30**	**<QL**
10th %	**6.8**	**7.4**	**0**	**0**	**<QL**	**<QL**	**95**	**95**	**2**	**2**	**6.0**	**<QL**	**<QL**	**<QL**
Max	**7.2**	**7.9**	**579**	**579**	**9**	**9**	**575**	**575**	**19**	**19**	**9.7**	**37.2**	**37.2**	**<QL**
Min	**6.6**	**7.3**	**0**	**0**	**<QL**	**<QL**	**61**	**61**	**1**	**1**	**<QL**	**0**	**<QL**	**<QL**
Avg	**6.9**	**7.6**	**285**	**285**	**5**	**5**	**260**	**260**	**6**	**6**	**7.1**	**2.90**	**2.90**	**<QL**

2013 Application Data Summary					Wasteload Allocations (MSTRANTI version 2b, 2012)				WQS-Based Limitation
Parameter	Required QL	Reported QL	AVG	MAX	WLA_{acute}	$WLA_{chronic}$	HH(PWS)	HH	
Ammonia as NH_3-N (mg/L)	0.20	0.10	-	42.9	12.1/1090*	1.29/1020*	-	-	2.60**
Arsenic, dissolved (μg/L)	1.0	0.20		0.30	340	150	-	-	No
Chromium-III, dissolved (μg/L)	3.6	3.0		1	790	100	-	-	No
Chromium-VI, dissolved (μg/L)	1.6	3.0		<3.0	16	11	-	-	No
Chromium-Total, dissolved (μg/L)	1.6	1.0		1.0	-	-	-	-	No
Copper, dissolved (μg/L)	0.50	0.20	-	2.8	20	13	-	-	No
Nickel, dissolved (μg/L)	0.94	0.20	-	0.90	260	29	-	28,000	No
Zinc, dissolved (μg/L)	3.6	2.5	-	159	160	170	-	160,000	160***
Chlorides (mg/L)	DBP	1.0	-	145	860	230	-	-	340***
Hardness (mg/L as $CaCO_3$)	DBP	0.33	-	149	-	-	-	-	-
pH (MIN; MAX), s.u.	-	-	-	6.9; 7.9	6.0 - 9.0$				
Temperature, Winter (F; C)	-	-	36; 2.2	67; 19	-	-	-	-	-
Temperature, Summer (F; C)	-	-	86; 30	105; 41	-	-	-	-	-
Biochemical Oxygen Demand, BOD-5 (mg/L)	2	2	6.6	7	-	-	-	-	-
Total Suspended Solids, TSS (mg/L)	1.0	1.0	4.0	7.0	-	-	-	-	-

DBP = Determined by permittee using approved method
AVG = Average value reported on 2013 application
MAX = Maximum value reported on 2013 application
QL = Quantification Level
* Low Flow/High Flow WLAs are given for Ammonia-N WLA.
** Ammonia-N limitation for Low Flow conditions only; no limitation required for High Flow conditions; represented in 3 significant figures.
*** Represented in 2 significant figures.
$ pH range of 6.0 - 9.0 s.u. represents water quality numerical criteria for Class III Non-Tidal Waters in accordance with 9 VAC25-260-50.

Data above represents data results reported in 2013 application (EPA Form 2A and Attachment A DEQ Water Quality Criteria Monitoring)

Cohen, Tamira (DEQ)

From: MSmith [threecreek@telpage.net]
Sent: Friday, June 28, 2013 4:38 PM
To: Cohen, Tamira (DEQ)
Cc: Warf, James [DHCD-CLG] (DHCD)
Subject: GCWSA - Skippers WWTP

Follow Up Flag: Follow up
Due By: Tuesday, July 09, 2013 7:00 AM
Flag Status: Completed

Tammy,

James asked me to send you zinc and chloride data for the Skippers plant. Samples were taken on 5/17/13 – zinc = 0.056mg/l and chloride = 140mg/l. The floating aerator in one of the basins was out of service for motor repairs for a few days, these samples were pulled a few days after the basin was put back online. If you think having more data would be beneficial I can get more.

Thanks and have a nice weekend,

Michael
GCWSA
757-653-1445

Attachment F

Mixing Analysis Results and Data

(Input sources were obtained as follows: effluent flow-permit application; stream flows-Flow Frequency Determination Memorandum-See Attachment A; physical stream characteristics-2003,2008 permit reissuances.)

Mixing Zone Predictions for SKIPPERS WWTF - LOW FLOW

Effluent Flow = 0.036 MGD
Stream 7Q10 = 0.004 MGD
Stream 30Q10 = 0.04 MGD
Stream 1Q10 = 0.000000000000001 MGD
Stream slope = .00038 ft/ft
Stream width = 50 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .0401 ft
Length = 34801.08 ft
Velocity = .0309 ft/sec
Residence Time = 13.0377 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 15.34% of the 7Q10 is used.

Mixing Zone Predictions @ 30Q10

Depth = .0589 ft
Length = 25228.01 ft
Velocity = .0399 ft/sec
Residence Time = 7.3135 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 27.35% of the 30Q10 is used.

Mixing Zone Predictions @ 1Q10

Depth = .0376 ft
Length = 36686.49 ft
Velocity = .0296 ft/sec
Residence Time = 344.0443 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than .29% of the 1Q10 is used.

Mixing Zone Predictions for SKIPPERS WWTF - HIGH FLOW

Effluent Flow = 0.036 MGD
Stream 7Q10 = 6.2 MGD
Stream 30Q10 = 12 MGD
Stream 1Q10 = 5.1 MGD
Stream slope = .00038 ft/ft
Stream width = 50 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .8398 ft
Length = 2700.9 ft
Velocity = .2299 ft/sec
Residence Time = .136 days

Recommendation:

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

Mixing Zone Predictions @ 30Q10

Depth = 1.2538 ft
Length = 1913.61 ft
Velocity = .2972 ft/sec
Residence Time = .0745 days

Recommendation:

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

Mixing Zone Predictions @ 1Q10

Depth = .7464 ft
Length = 2987.01 ft
Velocity = .213 ft/sec
Residence Time = 3.8946 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 25.68% of the 1Q10 is used.

Attachment G

MSTRANTI Printout and MSTRANTI Data Source Report

MSTRANTI DATA SOURCE REPORT

Stream information	
Mean Hardness	STORET data
90% Temperature (annual)	STORET data
90% Temperature (wet season)	STORET data (annual used as conservative measure ammonia tier based on flow)
90% Maximum pH	STORET data
10% Maximum pH	STORET data
Tier Designation	Tier Determination (Item 14 in Fact Sheet)
Stream Flows	
All Data	See flow frequencies (Item 5 in Fact Sheet)
Mixing Information	
All Data	Mixing zone output (Attachment F)
Effluent Information	
Mean Hardness	2013 application
90% Temperature	Maximum daily temperature used for both annual and wet season (provided in permit application) used as a conservative measure given temperature data set was not provided (permit application only requires summer and winter daily maximums and averages. Ammonia tiered based on flow.
90% Maximum pH	Effluent DMR Data
10% Maximum pH	Effluent DMR Data
Discharge flow	Design flow obtained from permit application

Data Location:

Flow Frequency Description – Attachment A
Effluent Data – Attachment E
Mixing Analysis Results and Data – Attachment F

2013 Permit Reissuance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: **Skippers WWTF** Permit No.: **VA0028916**

Receiving Stream: **Fontaine Creek aka Fountains Creek** Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		
Mean Hardness (as CaCO3) =	**46**	mg/L
90% Temperature (Annual) =	**23.3**	deg C
90% Temperature (Wet season) =	**23.3**	deg C
90% Maximum pH =	**7.2**	SU
10% Maximum pH =	**6.2**	SU
Tier Designation (1 or 2) =	**1**	
Public Water Supply (PWS) Y/N? =	**n**	
Trout Present Y/N? =	**n**	
Early Life Stages Present Y/N? =	**y**	

Stream Flows		
1Q10 (Annual) =	**0**	MGD
7Q10 (Annual) =	**0.004**	MGD
30Q10 (Annual) =	**0.04**	MGD
1Q10 (Wet season) =	**5.1**	MGD
30Q10 (Wet season) =	**12**	MGD
30Q5 =	**0.18**	MGD
Harmonic Mean =	**0**	MGD

Mixing Information		
Annual - 1Q10 Mix =	**0.29**	%
- 7Q10 Mix =	**15.34**	%
- 30Q10 Mix =	**27.35**	%
Wet Season - 1Q10 Mix =	**25.68**	%
- 30Q10 Mix =	**100**	%

Effluent Information		
Mean Hardness (as CaCO3) =	**149**	mg/L
90% Temp (Annual) =	**40.6**	deg C
90% Temp (Wet season) =	**40.6**	deg C
90% Maximum pH =	**7.8**	SU
10% Maximum pH =	**7.4**	SU
Discharge Flow =	**0.036**	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+03**
Acrolein	0	--	--	na	9.3E+00	--	--	na	5.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.6E+01**
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.5E+00**
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	**3.0E+00**	**--**	**na**	**5.0E-04**
Ammonia-N (mg/l) (Yearly)	0	1.21E+01	9.87E-01	na	--	1.21E+01	1.29E+00	na	--	--	--	--	--	--	--	--	--	**1.21E+01**	**1.29E+00**	**na**	**--**
Ammonia-N (mg/l) (High Flow)	0	2.92E+01	3.05E+00	na	--	1.09E+03	1.02E+03	na	--	--	--	--	--	--	--	--	--	**1.09E+03**	**1.02E+03**	**na**	**--**
Anthracene	0	--	--	na	4.0E+04	--	--	na	2.4E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+05**
Antimony	0	--	--	na	6.4E+02	--	--	na	3.8E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.8E+03**
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	**3.4E+02**	**1.5E+02**	**na**	**--**
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E+02**
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E-03**
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.3E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	3.9E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.9E+05**
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E+01**
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+03**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+04**
Cadmium	0	6.1E+00	1.5E+00	na	--	6.1E+00	1.6E+00	na	--	--	--	--	--	--	--	--	--	**6.1E+00**	**1.6E+00**	**na**	**--**
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+01**
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.4E-03	na	8.1E-03	--	--	--	--	--	--	--	--	**2.4E+00**	**4.4E-03**	**na**	**8.1E-03**
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	**8.6E+05**	**2.3E+05**	**na**	**--**
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	**na**	**--**
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.6E+03**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+02**
Chloroform	0	--	--	na	1.1E+04	--	--	na	6.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+04**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.6E+03**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	9.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.0E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.2E-02	na	--	--	--	--	--	--	--	--	--	**8.3E-02**	**4.2E-02**	**na**	**--**
Chromium III	0	7.9E+02	1.0E+02	na	--	7.9E+02	1.0E+02	na	--	--	--	--	--	--	--	--	--	**7.9E+02**	**1.0E+02**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.1E+01**	**na**	**--**
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-02**
Copper	0	2.0E+01	1.2E+01	na	--	2.0E+01	1.3E+01	na	--	--	--	--	--	--	--	--	--	**2.0E+01**	**1.3E+01**	**na**	**--**
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.3E+00	na	9.6E+04	--	--	--	--	--	--	--	--	**2.2E+01**	**5.3E+00**	**na**	**9.6E+04**
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.1E-03**
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.2E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.0E-03**	**na**	**2.2E-03**
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	**1.7E-01**	**1.7E-01**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	7.8E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.8E+03**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	5.8E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.8E+03**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+03**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.8E-01**
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+02**
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.7E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	4.3E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	6.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+04**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+03**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+02**
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+02**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.7E-02	na	5.4E-04	--	--	--	--	--	--	--	--	**2.4E-01**	**5.7E-02**	**na**	**5.4E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	2.6E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+05**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	5.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E+03**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	6.6E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+06**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	2.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.7E+04**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	3.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+03**
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+01**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	3.1E-07	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.1E-07**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.7E-02	na	5.3E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.7E-02**	**na**	**5.3E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.7E-02	na	5.3E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**5.7E-02**	**na**	**5.3E+02**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.7E-02	--	--	--	--	--	--	--	--	--	--	**2.2E-01**	**5.7E-02**	**--**	**--**
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	5.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.3E+02**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.7E-02	na	3.6E-01	--	--	--	--	--	--	--	--	**8.6E-02**	**3.7E-02**	**na**	**3.6E-01**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	1.8E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+00**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+04**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	8.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.4E+02**
Fluorene	0	--	--	na	5.3E+03	--	--	na	3.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-02**	**na**	**--**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.9E-03	na	7.9E-04	--	--	--	--	--	--	--	--	**5.2E-01**	**3.9E-03**	**na**	**7.9E-04**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.9E-03	na	3.9E-04	--	--	--	--	--	--	--	--	**5.2E-01**	**3.9E-03**	**na**	**3.9E-04**
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E-03**
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+02**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-02**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E-01**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	**9.5E-01**	**--**	**na**	**1.8E+00**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	6.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+03**
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**2.0E+00**	**na**	**--**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.6E+03**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	2.0E+02	2.2E+01	na	--	2.0E+02	2.2E+01	na	--	--	--	--	--	--	--	--	--	**2.0E+02**	**2.2E+01**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	- -	- -	1.4E+00	7.8E-01	- -	- -	--	--	--	--	--	--	--	--	**1.4E+00**	**7.8E-01**	**- -**	**- -**
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	9.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.0E+03**
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	3.1E-02	na	--	--	--	--	--	--	--	--	--	**--**	**3.1E-02**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Nickel	0	2.6E+02	2.8E+01	na	4.6E+03	2.6E+02	2.9E+01	na	2.8E+04	--	--	--	--	--	--	--	--	**2.6E+02**	**2.9E+01**	**na**	**2.8E+04**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	4.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.1E+03**
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+01**
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+01**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E+00**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.7E+00	na	--	--	--	--	--	--	--	--	--	**2.8E+01**	**6.7E+00**	**na**	**--**
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	**6.5E-02**	**1.3E-02**	**na**	**--**
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.4E-04	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**6.4E-04**
Pentachlorophenol [C]	0	1.3E+01	9.1E+00	na	3.0E+01	1.3E+01	9.2E+00	na	3.0E+01	--	--	--	--	--	--	--	--	**1.3E+01**	**9.2E+00**	**na**	**3.0E+01**
Phenol	0	--	--	na	8.6E+05	--	--	na	5.2E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.2E+06**
Pyrene	0	--	--	na	4.0E+03	--	--	na	2.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+04**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.1E+00	na	2.5E+04	--	--	--	--	--	--	--	--	**2.0E+01**	**5.1E+00**	**na**	**2.5E+04**
Silver	0	6.9E+00	--	na	--	6.9E+00	--	na	--	--	--	--	--	--	--	--	--	**6.9E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	2.8E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.8E+00**
Toluene	0	--	--	na	6.0E+03	--	--	na	3.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.6E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.3E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.3E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.2E+02**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
Zinc	0	1.6E+02	1.6E+02	na	2.6E+04	1.6E+02	1.7E+02	na	1.6E+05	--	--	--	--	--	--	--	--	**1.6E+02**	**1.7E+02**	**na**	**1.6E+05**

Notes:

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

Metal	Target Value (SSTV)
Antimony	3.8E+03
Arsenic	9.2E+01
Barium	na
Cadmium	9.4E-01
Chromium III	6.2E+01
Chromium VI	6.4E+00
Copper	7.6E+00
Iron	na
Lead	1.3E+01
Manganese	na
Mercury	4.7E-01
Nickel	1.7E+01
Selenium	3.1E+00
Silver	2.7E+00
Zinc	6.6E+01

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

Attachment H

STATS.exe Output

5/14/2013 12:59:31 PM

Facility = Skippers WWTF
Chemical = Ammonia - Low Flow, mg/L
Chronic averaging period = 30
WLAa = 12.1
WLAc = 1.29
Q.L. = 0.200
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

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

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 2.60279442050704
Average Weekly limit = 2.60279442050704
Average Monthly LImit = 2.60279442050704

The data are:

9

5/16/2013 8:22:42 AM

Facility = Skippers WWTF
Chemical = Ammonia - High Flow, mg/L
Chronic averaging period = 30
WLAa = 1090
WLAc = 1020
Q.L. = 0.20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

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

No Limit is required for this material

The data are:

9

5/14/2013 1:01:28 PM

Facility = Skippers WWTF
Chemical = Total Residual Chlorine, ug/L
Chronic averaging period = 4
WLAa = 19
WLAc = 11
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = 20000
Variance = 1440000
C.V. = 0.6
97th percentile daily values = 48668.3
97th percentile 4 day average = 33275.8
97th percentile 30 day average= 24121.0
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 16.0883226245855
Average Weekly limit = 9.8252545713861
Average Monthly LImit = 7.9737131838758

The data are:

20000

5/14/2013 1:03:50 PM

Facility = Skippers WWTF
Chemical = Arsenic, ug/L
Chronic averaging period = 4
WLAa = 340
WLAc = 150
Q.L. = 0.20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = .3
Variance = .0324
C.V. = 0.6
97th percentile daily values = .730025
97th percentile 4 day average = .499137
97th percentile 30 day average= .361815
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

0.3

7/22/2013 9:50:06 AM

Facility = Skippers WWTF
Chemical = Chlorides, mg/L
Chronic averaging period = 4
WLAa = 860
WLAc = 230
Q.L. = 1.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 2
Expected Value = 142.5
Variance = 7310.25
C.V. = 0.6
97th percentile daily values = 346.761
97th percentile 4 day average = 237.090
97th percentile 30 day average= 171.862
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 336.392200332243
Average Weekly limit = 336.392200332243
Average Monthly LImit = 336.392200332243

The data are:

145
140

5/14/2013 1:06:46 PM

Facility = Skippers WWTF
Chemical = Chromium-III, ug/L
Chronic averaging period = 4
WLAa = 790
WLAc = 100
Q.L. = 1.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 1
Variance = .36
C.V. = 0.6
97th percentile daily values = 2.43341
97th percentile 4 day average = 1.66379
97th percentile 30 day average= 1.20605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1

5/14/2013 1:08:33 PM

Facility = Skippers WWTF
Chemical = Chromium-VI, ug/L
Chronic averaging period = 4
WLAa = 16
WLAc = 11
Q.L. = 3.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 3
Variance = 3.24
C.V. = 0.6
97th percentile daily values = 7.30025
97th percentile 4 day average = 4.99137
97th percentile 30 day average= 3.61815
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

3

5/14/2013 1:09:20 PM

Facility = Skippers WWTF
Chemical = Copper, ug/L
Chronic averaging period = 4
WLAa = 20
WLAc = 13
Q.L. = 0.20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 2.8
Variance = 2.8224
C.V. = 0.6
97th percentile daily values = 6.81356
97th percentile 4 day average = 4.65861
97th percentile 30 day average= 3.37694
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

2.8

5/14/2013 1:10:00 PM

Facility = Skippers WWTF
Chemical = Nickel, ug/L
Chronic averaging period = 4
WLAa = 260
WLAc = 29
Q.L. = 0.20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = .9
Variance = .2916
C.V. = 0.6
97th percentile daily values = 2.19007
97th percentile 4 day average = 1.49741
97th percentile 30 day average= 1.08544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

0.9

7/22/2013 9:48:52 AM

Facility = Skippers WWTF
Chemical = Zinc, ug/L
Chronic averaging period = 4
WLAa = 160
WLAc = 170
Q.L. = 2.5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 2
Expected Value = 107.5
Variance = 4160.25
C.V. = 0.6
97th percentile daily values = 261.592
97th percentile 4 day average = 178.857
97th percentile 30 day average= 129.650
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 160
Average Weekly limit = 160
Average Monthly LImit = 160

The data are:

159
56

Attachment I

1989 Permit Modeling and Analysis Memorandum

(D.X. Ren's State Water Control Board Memorandum dated April 27, 1989)

MEMORANDUM

State Water Control Board
2111 North Hamilton Street P. O. Box 11143 Richmond, VA 23230

SUBJECT: **Econo Lodge, Greensville, Discharge into Fontaine Creek, Chowan River and Dismal Swamp Basin**

TO: **File**

FROM: **D. X. Ren**

DATE: **April 27, 1989**

On April 4, 1989, as requested by the permit section, I reviewed the current effluent limits of Econo Lodge's discharge. (Q = 0.036 MGD) for the applicability of swamp standards.

The site inspection was conducted on April 12, 1989. It indicated:

1) Econo Lodge has an intermittent discharge into Fontaine Creek.

2) About 0.5 mile downstream, there is the Trego Stone Corporation's discharge, no BOD5, D.O. limits assigned to the permit. The flow was calculated according to DMR's records of the past one and one-half years.

3) Near Econo Lodge's discharge point, one possible swamp characteristic was found; the water in Fontaine Creek looked brownish. However, the D.O. saturation percentage (103 - 110%) was observed as supersaturated during this site visit. The temperature was below 10°C.

4) About 8.1 miles below the discharge, the Fontaine Creek Swamp begins. The slope between these two points is very flat.

5) The flow in the Fontaine Creek during my site inspection was much higher than that expected. The velocity was about 0.375 fps.

The 7Q10 was calculated from the gage on Fontaine Creek near Brink, Virginia. This was the closest station to the point of discharge, and this value, 0.000 cfs/mi^2 was used. The critical temperature 28°c, was taken for this stream analysis.

The current Regional water quality model was used. The velocity, depth and width of channel were computed from rectangular channel dimensions according to the above 7Q10 and existing flow. Continuity is also calculated according to the velocity. The analysis was run by maintaining a D.O. at the sag point at the minimum level of 5.0 mg/l @ 28°c. It was modeled to the Swamp where the effluent limits meet the updated swamp standard limits. Antidegradation policy was not applied for this case.

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The results of this modeling efforts are listed as follows:

Q	= 0.036	MGD
$CBOD_5$	= 7.0	mg/l
TKN	= 6.0	mg/l
$CBODu/CBOD_5$	= 2.5	
D.O.	= 7.0	mg/l

Based on the investigation of this case, the following conclusion was reached:

> Adoption of the updated swamp standards is not justified for this case. The discharge travels 8.1 mile before reaching the swamp. The Fontaine Creek's channel was well defined until it reached the swampy area. The D.O. saturation percentage was high, as mentioned before.
>
> Therefore keeping the current effluent limits seemed acceptable for this case. These limits are Q = 0.036 MGD, BOD_5 = 24 mg/l, D.O. = 6.0 mg/l.

The computer printout and topo map are attached here for references.