Attachments

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Attachment A

Flow Frequency Memorandum

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

WEST CENTRAL REGIONAL OFFICE

3019 Peters Creek Rd. Roanoke, VA 24019

SUBJECT: Flow Frequency Determination
Craig Springs Camp and Retreat Center - #VA0027952

TO: Permit File

FROM: Kevin Harlow

DATE: May 5, 2008

COPIES: Kevin Harlow

This memo supercedes my previous flow frequency memorandum dated May 6, 2003.

The Craig Springs Camp and Retreat Center discharges to the Grannys Creek near Craig Springs, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The VDEQ has operated a continuous record gage on the Johns Creek at New Castle, VA (#02017500) since 1926. The gage is located at the Route 615 bridge in New Castle, VA. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge pint were determined by drainage area proportions and do not address any withdrawals, discharges, or springs lying upstream.

Johns Creek at New Castle, VA (#02017500):

Drainage Area = 104 mi^2

1Q10 = 7.2 cfs (4.1 MGD)	High Flow 1Q10 = 15 cfs (9.7 MGD)
7Q10 = 7.7 cfs (5.0 MGD)	High Flow 7Q10 = 17 cfs (11 MGD)
30Q5 = 10 cfs (6.5 MGD)	High Flow 30Q10 = 25 cfs (16 MGD)
30Q10 = 9.0 cfs (5.8 MGD)	HM = 33 cfs (21 MGD)
1Q30 = 6.4 cfs (4.1 MGD)	Annual Average = 130 cfs (84 MGD)

Grannys Creek at discharge point:

Drainage Area = 1.64 mi^2

1Q10 = 0.11 cfs (0.07 MGD)	High Flow 1Q10 = 0.24 cfs (0.15 MGD)
7Q10 = 0.12 cfs (0.08 MGD)	High Flow 7Q10 = 0.27 cfs (0.17 MGD)
30Q5 = 0.16 cfs (0.10 MGD)	High Flow 30Q10 = 0.39 cfs (0.25 MGD)
30Q10 = 0.14 cfs (0.09 MGD)	HM = 0.52 cfs (0.34 MGD)
1Q30 = 0.10 cfs (0.07 MGD)	Annual Average = 2.1 cfs (1.3 MGD)

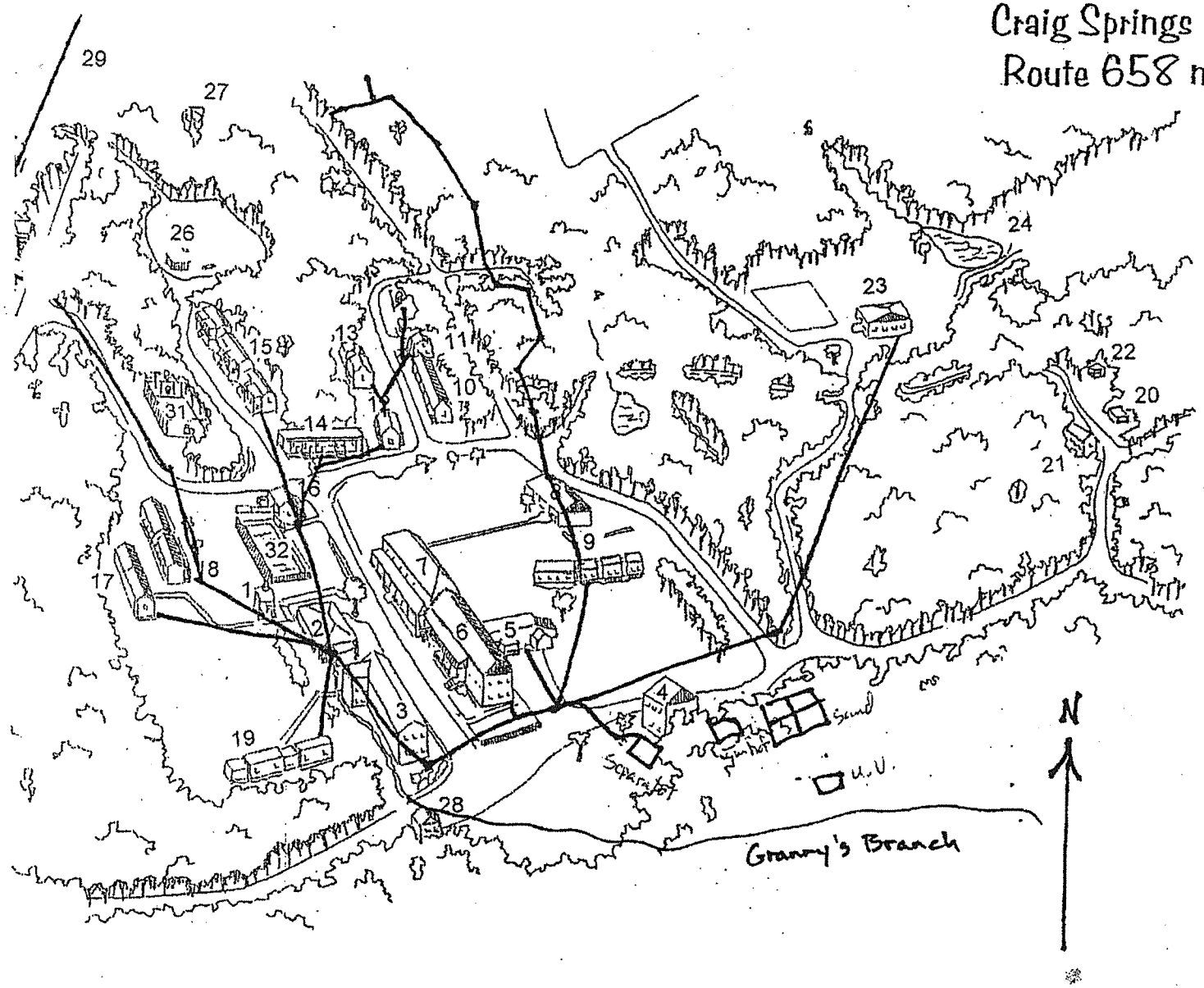
The high flow months are December through May.

Attachment B

Wastewater Treatment Diagrams

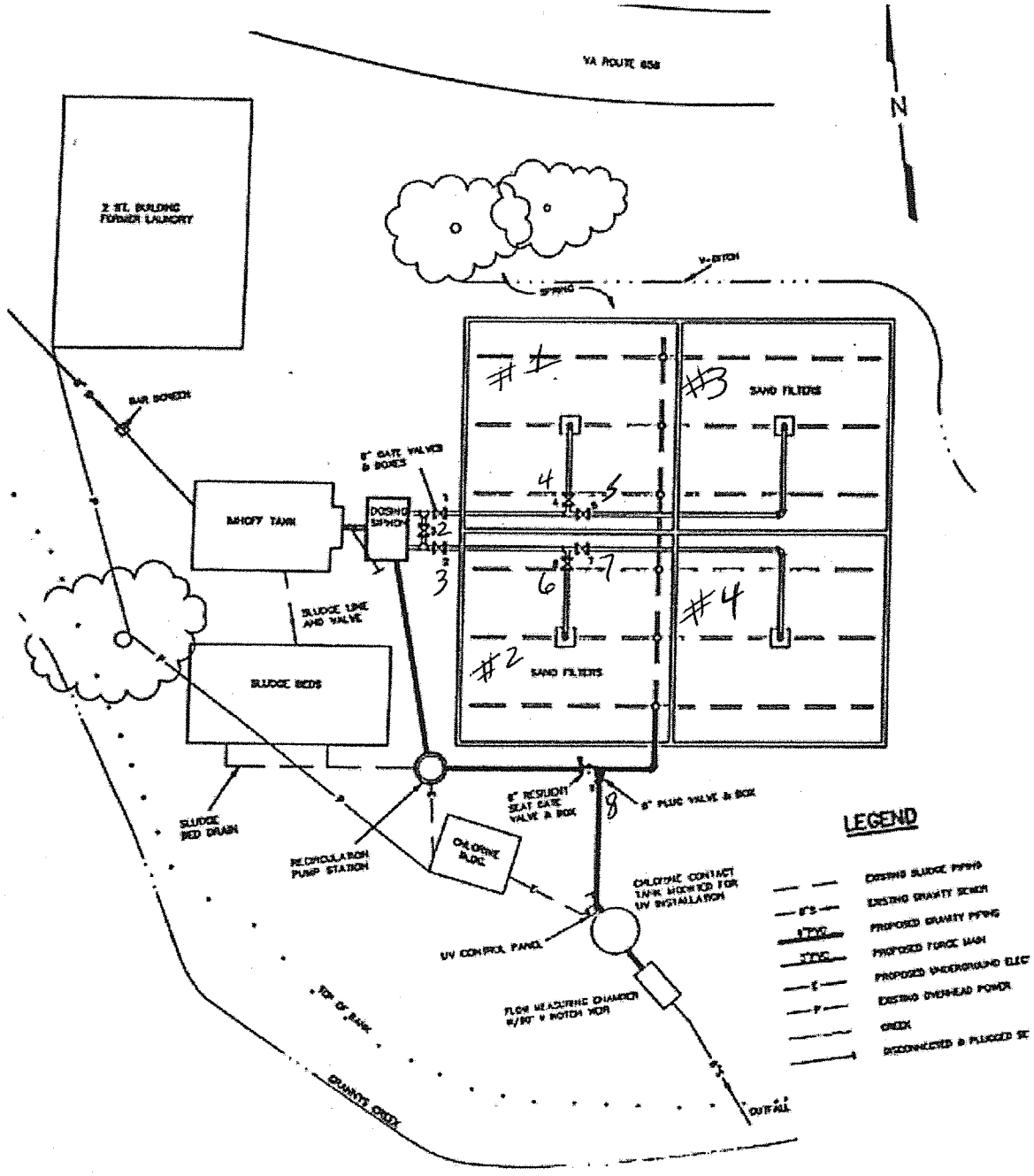
Sewer

Craig Springs Camp and Retreat Center
Route 658 near New Castle, Virginia



1. Spring House
2. Glass House
3. Oak Lodge
4. Garage
5. Kitchen
6. Dining Hall
7. Central Hotel/Office
8. Picnic Shelter
9. Alleghany & Charleston Cabins
10. West Virginia Cabins
11. Wynn Cottage (Facilities Manager)
12. Miami Cottage
13. Richmond Cottage
14. Salem Cottage
15. Brookside Cottages
16. Logan Cottage (Nurse's Station)
17. Bluefield Cabin
18. Monroe Cabin
19. Lynchburg & Roanoke Cabins
20. Water Pump House
21. Lumber Storage
22. Monte Vista Spring
23. Club House
24. Pond and Old Golf Course
25. Sand Pit
26. Ball Field
27. Tree House
28. Plumbing Shed
29. Trail to campsites and Pott's Mountain
30. Westover Retreat House
31. Basketball/Volleyball Court
32. Swimming Pool

ATTACHMENT V-1



Attachment C

Site Visit Report

MEMORANDUM
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WEST CENTRAL REGIONAL OFFICE
WATER DIVISION

3019 Peters Creek Road **Roanoke, Virginia 24019-2738**

SUBJECT: Site visit for VPDES Permit Reissuance - VA0027952
Craig Springs Camp and Retreat Center

To: Permit files VPDES permit VA0027952

From: Kevin A. Harlow, Environmental Engineer Sr.

Date: May 12, 2008

On Wednesday May 12, 2008, the writer met with Alisha Bennett and performed a site visit at Craig Springs Camp and Retreat Center. The camp was originally constructed around the turn of the century and operated as a resort. The Christian Church Disciples of Christ in Virginia purchased the site in 1960. In addition to cabins, a conference center, and a kitchen, there are approximately 25 private cabins that are hooked onto the facility's water and sewer service. The facility closes for winter. The facility is continuously used for about 4 months with limited or weekend use for the rest of the year. There are a maximum of 120 campers and 30 staff onsite during the 8 week program season.

The treatment system consists of an Imhoff tank, dosing siphon, sand filters (4 beds), recirculation pump, ultraviolet disinfection, v-notch weir for effluent flow measurements, and an unused sludge drying bed. The Imhoff tank has been onsite for a long time, but there are no estimates of how old it is. The rest of the system was installed about 20 years ago. The Imhoff tank is uncovered. Based on a statement by a previous operator, the tank is approximately 27 feet deep. Although the camp is closed for the winter, there was flow to the Imhoff tank. There apparently is enough I&I in the system so that the system cannot be shut down for the winter. There was no evidence of any surface sheen, grease, or odor associated with the Imhoff tank. The lid to the dosing siphon was not removed. The siphon doses 600 gallons at a time to two sand beds. At the end of the season, the facility switches to the other two sand filters and rests the first two. The two sand beds that were in operation had a small amount of grass/moss on the surface. There was no evidence of organic buildup. The flow from the sand filters can be valved so that it flows directly through the UV system and discharged or it can be directed to the recirculation pump station. The pump station returns the flow to the dosing siphon box. The system has a UV intensity meter and a meter that tracks hours of operation. As noted previously, although the camp was closed for the season there was flow to the Imhoff tank due to I&I. There appeared to be a small amount of flow at the weir. The effluent pipe is shore based and in good condition. The pipe exits the weir box and the discharge drops onto riprap before joining the stream in approximately 6 feet. There was no evidence of sludge bars, sheens, foam, etc. at the discharge point.

The stream itself varies from 8 to 10 feet across. The bottom has small to medium rocks. The water depth ranges from 1 foot to 6 inches. There is some moss/algae on rocks near the shoreline. There are about 50% pools and riffles. The reaeration rate is expected to be high.

Attachment D

USGS Topographic Map

TopoZone.com

Target is UTM 17 562661E 4148673N - **CRAIG SPRINGS** quad [Quad Info]

http://www.topozone.com/print.asp?z=17&n=4148673&e=562661

12/16/2002

Attachment E

Ambient Water Quality Information

- STORET Data (Station 2-JOB000.39)
- 2006 Impaired Waters Report (Excerpt)

Collection Date Time	Temp (C)	Do (mg/L)	pH (s.u.)	Hardness (mg/L)	Hi-Flow
11/04/1991 14:30	7.2		8.70	80	0
06/01/1992 09:45	13.8	10.4	6.95	16	0
06/24/1992 14:30					0
09/08/1992 08:10	21.5	7.7	7.80		0
09/17/1992 08:30	17.0	8.5	7.40	66	0
11/04/1992 08:15					0
06/08/1993 09:00	19.4	8.6	7.70	32	0
09/15/1993 08:25	18.6	8.1	8.00	80	0
06/28/1994 09:40	21.4	7.9	7.88	48	0
06/28/1994 09:55					0
09/07/1994 09:15	17.9	8.7	8.00	47	0
06/27/1995 07:20	19.9	8.4	6.34	19	0
09/06/1995 09:10	18.3	8.4	7.95	76	0
09/06/1995 09:15					0
06/17/1996 09:30	20.4	8.4	8.40	16	0
09/09/1996 12:45	22.9	8.6	8.20	13	0
06/09/1997 08:45	13.5	9.8	7.04	13.9	0
09/03/1997 07:20	21.4	7.4	7.91	79.6	0
09/03/1997 07:30					0
06/02/1998 07:05	19.5	7.4	7.74	50.2	0
07/16/1998 00:00					0
07/16/1998 08:15					0
09/21/1998 07:20	20.6	8.1	8.10	83.3	0
06/23/1999 07:50	18.0	8.3	8.02	66.2	0
07/12/1999 13:30	21.0	6.7	8.30	86.8	0
09/08/1999 13:00	21.1	7.8		26.5	0
11/03/1999 14:00	9.5	10.2	7.00		0
07/10/2000 13:00	25.1	7.4	7.90	38	0
09/07/2000 12:30	17.2	9.4	7.60	33.5	0
10/18/2000 13:00	14.4	9.1	8.70	50	0
07/27/2005 15:00	27.7	6.6	8.20		0
09/13/2005 13:30	18.3	9.2	8.10		0
11/02/2005 13:40	8.9	11.5	7.60		0
07/13/2006 12:45	23.2	8.0	7.60		0
09/11/2006 13:45	19.6	9.2	7.40		0
11/14/2006 12:40	10.5	10.7	7.60		0
06/02/2011 11:10	20.6	8.6	8.10		0
08/04/2011 11:35	24.7	8.1	8.00		0
10/06/2011 12:40	14.3	10.4	7.70		0
07/12/2012 10:30	22.6	8.0	7.80		0
09/10/2012 11:45	17.6	8.7	8.00		0
09/25/2012 10:30	12.4	10.5	7.60	26	0
11/13/2012 11:45	8.5	10.7	6.90		0
04/18/1989 09:00				20	1
12/03/1991 08:20	10.7	10.2	7.90	24	1
03/03/1992 08:00	8.5	10.6	7.90	12	1
12/07/1992 08:30	1.6	12.9	8.50	29	1
03/03/1993 08:30	5.1	12.6	8.80	14	1
12/06/1993 09:30	7.1	11.1	8.10	82	1
03/08/1994 08:15	8.5	11.4	8.60	10	1
12/06/1994 09:25	9.0	11.2	8.10	49	1

03/01/1995 09:35	8.1	11.6	7.38	15	1
12/05/1995 09:00	4.9	13.0	6.62	27	1
03/27/1996 07:00	6.1	12.0	6.63	16	1
12/10/1996 08:30	3.3	13.4	8.34	24.7	1
03/12/1997 08:30	7.8	11.4	7.35	12.5	1
03/12/1997 08:40					1
12/01/1997 09:00	7.4	11.2	8.74	60.1	1
03/03/1998 08:05	6.0	10.7	7.46	22.4	1
12/07/1998 07:30	9.3	10.7	8.26	68	1
03/18/1999 07:20	7.7	11.6	7.95	14	1
01/06/2000 14:00	3.7	10.9	8.00	36.2	1
03/06/2000 14:00	11.7	10.0	8.20	20	1
05/02/2000 14:30	16.4	9.3	7.90	13	1
05/02/2000 14:40					1
01/10/2001 13:30	0.4	15.4	8.20	36.7	1
03/12/2001 13:30	6.8	12.1	8.20	14.6	1
05/02/2001 13:30	18.5	9.9	8.60	23.4	1
01/10/2006 13:45	5.2	12.8	7.40		1
03/01/2006 13:20	8.5	11.1	7.80		1
05/10/2006 16:45	16.0	9.9	7.40		1
02/09/2011 10:15	0.6	13.9	7.70		1
04/21/2011 10:40	13.3		7.80		1
12/19/2011 12:45	4.0	12.2	7.60		1
02/07/2012 12:00	5.5	12.4	8.10		1
03/12/2012 10:55	7.7	12.1	8.20		1
04/16/2012 13:30	18.9	9.3	7.43	22	1
05/16/2012 12:20	16.8	10.3	7.30		1
Average	13.4	10.0	7.83	37.2	
90th%'ile	21.4		8.4		
90th%'ile Wet Season	16.4				
10th%'ile			7.20		

2010 Impaired Waters

Categories 4 and 5 by DCR Watershed*

James River Basin

Fact Sheet prepared for DCR Watershed: I21*

Cause Group Code: **I21R-01-BAC** **Johns Creek**

Location: Johns Creek mainstem from near Lovers Leap upstream of New Castle downstream to its confluence with Craig Creek.

City / County: Craig Co.

Use(s): Recreation

Cause(s) / VA Category: Fecal Coliform/ 5A

The 2004 initially 303(d) Listed bacteria impairment remains. These waters lack sufficient data to delist the Recreational Use for bacteria as 12 escherichia coli (E.coli) observations are required and therefore remains 303(d) Listed for bacteria. Ultimately E.coli will replace fecal coliform (FC) bacteria as the indicator as per Water Quality Standards [9 VAC 25-260-170. Bacteria; other waters].

2-JOB000.39 (Rt. 615 Bridge near USGS Gaging Station)- The 2010 assessment finds no excursions of either fecal coliform (FC) or escherichia coli (E.coli) from nine observations each (2005 thru 2006). Data within the 2008 data window (2001 thru 2006) reveal no excursions of the former instantaneous criterion for FC or current E.coli instantaneous criterion of 235 cfu/100 ml from nine observations each; as in the 2006 IR. However the 2004 IR reports FC exceeds the former 400 cfu/100 ml WQS instantaneous criterion in two of 18 samples at 1500 cfu/100 ml and 600.

Assessment Unit / Water Name / Description	Cause Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAW-I21R_JOB01A00 / Johns Creek / Johns Creek mainstem from near Lovers Leap upstream of New Castle downstream to its mouth on Craig Creek.	5A Fecal Coliform		2004	2016	2.19

Johns Creek **DCR Watershed: I21***	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Fecal Coliform - Total Impaired Size by Water Type:			**2.19**

Sources:

Municipal (Urbanized High Density Area)	Unspecified Domestic Waste	Wastes from Pets	Wildlife Other than Waterfowl

*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

Attachment F

Wasteload and Limit Calculations

- Mixing Zone Calculations (MIXER)
- Wasteload Allocation Spreadsheet
- STATS Program Results
- Regional Model for Free Flowing Streams

Mixing Zone Predictions for Craig Springs VA0027952

Effluent Flow = 0.01 MGD
Stream 7Q10 = 0.08 MGD
Stream 30Q10 = 0.14 MGD
Stream 1Q10 = 0.07 MGD
Stream slope = 0.005 ft/ft
Stream width = 8 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .0911 ft
Length = 443.1 ft
Velocity = .1911 ft/sec
Residence Time = .0268 days

Recommendation:

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

Mixing Zone Predictions @ 30Q10

Depth = .1242 ft
Length = 340.47 ft
Velocity = .2336 ft/sec
Residence Time = .0169 days

Recommendation:

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

Mixing Zone Predictions @ 1Q10

Depth = .0849 ft
Length = 470.7 ft
Velocity = .1824 ft/sec
Residence Time = .7168 hours

Recommendation:

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

Craig Springs Camp and Conference Center - VA0027952
Effluent Daily pH Data

Date	Dec*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1	7	7.2	7.2	7.4	7.2	7.2	6.8	6.8	6.8	7.2	7.2	7.4
2	7	7.2	7.2	7.4	7.2	7.2	6.8	6.8	6.8	7.2	7.2	7.4
3	7	7.2	7.2	7.4	7.2	7.2	6.8	7	6.8	7.2	7.2	7.2
4	7	7.2	7.2	7.4	7.2	7.2	6.8	6.8	6.5	7.2	7.2	7.2
5	7	7.2	7.2	7.4	7.2	7.2	6.8	6.8	6.5	7.2	7.2	7.4
6	7	7.2	7.2	7.2	7.2	7.4	6.8	6.8		7.2	6.5	
7	7	7.2		7.2	7.2		7.2	6.8		7.2	7	7.4
8	7	7.4		7.4	7.2		7.2	6.8		7.2	7.2	7.4
9	7	7.2	7.2	7.4	7.2	7.4	7.2	7		7.2	7.2	7.5
10	7	7.2	7.2	7.2	7.2	7.2	7.2	7		7.2	7.2	7.5
11	7	7.2	7.2	7.2	7.2	7.4	7.2	7		7.2	7.2	7.5
12	7.2	7.2	7.2	7.2	7.2	7.4	7.2	6.8		7.2	7.2	7.5
13	7.2	7.2		7.4	7.2		7.2	7		7.2	7.2	7.5
14	7.2	7.2			7.2	7.4	7.2	7	6.5	7.2	7.2	7.4
15	7.2	7.2	7.2	7.4	7.2	7.2	7.2	7	6.5	7.2	7.4	
16	7.2	7.4	7.2	7.4		7	7.2	7	6.8	7.2	7.4	7.4
17	7.5	7.4	7.2	7.2	7.2	7.2	7.2	6.5	6.8	7.2	7.4	7.4
18	7.5	7.4	7.2	7.2	7.2	7.2	7.2	7	6.5	7.2	7.4	7.5
19	7.5	7.4	7.2	7.2	7.2	7.2	7.2	6.8	6.5	7.2	7.2	7.5
20	7.5	7.4	7.2	7.4	7.2	7.2	7.2	6.8		7.2	7.4	7.6
21	7.5		7.2	7.4	7.2	7.2	7.2	6.8	6.5	7.2	7.5	7.6
22	7.5	7.5	7.2	7.4	7.2	7.2	7.2	7	6.8	7.2	7.2	7.6
23	7.5	7.5	7.2	7.4	7.2	7	7.2	7	6.8	7.2	7	7.5
24	7.5	7.7	7.2	7.4	7.2	7.2	7.2	7	6.8	7.2	6.8	
25		7.5	7.2	7.4	7.2	7.2	7.2	7	7	7.2	7	
26	7.2	7.7	7.2	7.4	7.2	7	6.8	6.8	7.2	7.2	7	7.5
27	7.2	7.5	7.2	7.4	7.2	7	6.8	6.8	7.2	7.2	7.2	7.5
28	7.2	7.5	7.4	7.4	7.2	7	6.8	6.5	7.2	7.2	7.2	7.5
29	7.2	7.5		7.4	7.2	7	6.8	6.5	7.2	7.2		
30	7.2	7.5		7.4	7.2	6.8	6.8	6.8	7.2	7.2		7.5
31	7.2	7.5		7.4	7.2	6.8		6.8		7.2	7.2	

90th percentile pH= 7.42 s.u. (annual)
10th percentile pH= 6.8 s.u. (annual)

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Craig Springs Camp & Retreat Center Permit No.: VA0027952

Receiving Stream: Grannys Run Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	37.23	mg/L
90% Temperature (Annual) =	21.4	deg C
90% Temperature (Wet season) =	16.4	deg C
90% Maximum pH =	8.4	SU
10% Maximum pH =	7.2	SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	N	
Trout Present Y/N? =	Y	
Early Life Stages Present Y/N? =	N	

Stream Flows

1Q10 (Annual) =	0.07	MGD
7Q10 (Annual) =	0.08	MGD
30Q10 (Annual) =	0.09	MGD
1Q10 (Wet season) =	0.15	MGD
30Q10 (Wet season)	0.25	MGD
30Q5 =	0.1	MGD
Harmonic Mean =	0.34	MGD

Mixing Information

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

Effluent Information

Mean Hardness (as CaCO3) =	100	mg/L
90% Temp (Annual) =	20	deg C
90% Temp (Wet season) =	12	deg C
90% Maximum pH =	7.21	SU
10% Maximum pH =	6.84	SU
Discharge Flow =	0.01	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.1E+04	--	--	na	9.9E+01	--	--	na	1.1E+03	--	--	na	1.1E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.0E+02	--	--	na	9.3E-01	--	--	na	1.0E+01	--	--	na	1.0E+01
Acrylonitrile[c]	0	--	--	na	2.5E+00	--	--	na	8.8E+01	--	--	na	2.5E-01	--	--	na	8.8E+00	--	--	na	8.8E+00
Aldrin[c]	0	3.0E+00	--	na	5.0E-04	2.4E+01	--	na	1.8E-02	7.5E-01	--	na	5.0E-05	6.0E+00	--	na	1.8E-03	6.0E+00	--	na	1.8E-03
Ammonia-N (mg/l) (Yearly)	0	6.15E+00	1.55E+00	na	--	4.92E+01	1.55E+01	na	--	1.54E+00	3.88E-01	na	--	1.23E+01	3.88E+00	na	--	1.23E+01	3.88E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	4.47E+00	1.59E+00	na	--	7.14E+01	4.12E+01	na	--	1.12E+00	3.97E-01	na	--	1.79E+01	1.03E+01	na	--	1.79E+01	1.03E+01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.4E+05	--	--	na	4.0E+03	--	--	na	4.4E+04	--	--	na	4.4E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	7.0E+03	--	--	na	6.4E+01	--	--	na	7.0E+02	--	--	na	7.0E+02
Arsenic	0	3.4E+02	1.5E+02	na	--	2.7E+03	1.4E+03	na	--	8.5E+01	3.8E+01	na	--	6.8E+02	3.4E+02	na	--	6.8E+02	3.4E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene[c]	0	--	--	na	5.1E+02	--	--	na	1.8E+04	--	--	na	5.1E+01	--	--	na	1.8E+03	--	--	na	1.8E+03
Benzidine[c]	0	--	--	na	2.0E-03	--	--	na	7.0E-02	--	--	na	2.0E-04	--	--	na	7.0E-03	--	--	na	7.0E-03
Benzo (a) anthracene[c]	0	--	--	na	1.8E-01	--	--	na	6.3E+00	--	--	na	1.8E-02	--	--	na	6.3E-01	--	--	na	6.3E-01
Benzo (b) fluoranthene[c]	0	--	--	na	1.8E-01	--	--	na	6.3E+00	--	--	na	1.8E-02	--	--	na	6.3E-01	--	--	na	6.3E-01
Benzo (k) fluoranthene[c]	0	--	--	na	1.8E-01	--	--	na	6.3E+00	--	--	na	1.8E-02	--	--	na	6.3E-01	--	--	na	6.3E-01
Benzo (a) pyrene[c]	0	--	--	na	1.8E-01	--	--	na	6.3E+00	--	--	na	1.8E-02	--	--	na	6.3E-01	--	--	na	6.3E-01
Bis2-Chloroethyl Ether[c]	0	--	--	na	5.3E+00	--	--	na	1.9E+02	--	--	na	5.3E-01	--	--	na	1.9E+01	--	--	na	1.9E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	7.2E+05	--	--	na	6.5E+03	--	--	na	7.2E+04	--	--	na	7.2E+04
Bis 2-Ethylhexyl Phthalate[c]	0	--	--	na	2.2E+01	--	--	na	7.7E+02	--	--	na	2.2E+00	--	--	na	7.7E+01	--	--	na	7.7E+01
Bromoform[c]	0	--	--	na	1.4E+03	--	--	na	4.9E+04	--	--	na	1.4E+02	--	--	na	4.9E+03	--	--	na	4.9E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	2.1E+04	--	--	na	1.9E+02	--	--	na	2.1E+03	--	--	na	2.1E+03
Cadmium	0	1.6E+00	6.0E-01	na	--	1.3E+01	5.4E+00	na	--	4.0E-01	1.5E-01	na	--	3.2E+00	1.3E+00	na	--	3.2E+00	1.3E+00	na	--
Carbon Tetrachloride[c]	0	--	--	na	1.6E+01	--	--	na	5.6E+02	--	--	na	1.6E+00	--	--	na	5.6E+01	--	--	na	5.6E+01
Chlordane[c]	0	2.4E+00	4.3E-03	na	8.1E-03	1.9E+01	3.9E-02	na	2.8E-01	6.0E-01	1.1E-03	na	8.1E-04	4.8E+00	9.7E-03	na	2.8E-02	4.8E+00	9.7E-03	na	2.8E-02
Chloride	0	8.6E+05	2.3E+05	na	--	6.9E+06	2.1E+06	na	--	2.2E+05	5.8E+04	na	--	1.7E+06	5.2E+05	na	--	1.7E+06	5.2E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.5E+02	9.9E+01	na	--	4.8E+00	2.8E+00	na	--	3.8E+01	2.5E+01	na	--	3.8E+01	2.5E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.8E+04	--	--	na	1.6E+02	--	--	na	1.8E+03	--	--	na	1.8E+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	4.6E+03	--	--	na	1.3E+01	--	--	na	4.6E+02	--	--	na	4.6E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.2E+05	--	--	na	1.1E+03	--	--	na	1.2E+04	--	--	na	1.2E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.8E+04	--	--	na	1.6E+02	--	--	na	1.8E+03	--	--	na	1.8E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.7E+03	--	--	na	1.5E+01	--	--	na	1.7E+02	--	--	na	1.7E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	6.6E-01	3.7E-01	na	--	2.1E-02	1.0E-02	na	--	1.7E-01	9.2E-02	na	--	1.7E-01	9.2E-02	na	--
Chromium III	0	3.0E+02	3.8E+01	na	--	2.4E+03	3.4E+02	na	--	7.4E+01	9.5E+00	na	--	5.9E+02	8.5E+01	na	--	5.9E+02	8.5E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.3E+02	9.9E+01	na	--	4.0E+00	2.8E+00	na	--	3.2E+01	2.5E+01	na	--	3.2E+01	2.5E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.1E+02	--	--	--	na	--
Chrysene[c]	0	--	--	na	1.8E-02	--	--	na	6.3E-01	--	--	na	1.8E-03	--	--	na	6.3E-02	--	--	na	6.3E-02
Copper	0	6.3E+00	4.5E+00	na	--	5.1E+01	4.0E+01	na	--	1.6E+00	1.1E+00	na	--	1.3E+01	1.0E+01	na	--	1.3E+01	1.0E+01	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	1.8E+02	4.7E+01	na	1.8E+05	5.5E+00	1.3E+00	na	1.6E+03	4.4E+01	1.2E+01	na	1.8E+04	4.4E+01	1.2E+01	na	1.8E+04
DDD[c]	0	--	--	na	3.1E-03	--	--	na	1.1E-01	--	--	na	3.1E-04	--	--	na	1.1E-02	--	--	na	1.1E-02
DDE[c]	0	--	--	na	2.2E-03	--	--	na	7.7E-02	--	--	na	2.2E-04	--	--	na	7.7E-03	--	--	na	7.7E-03
DDT[c]	0	1.1E+00	1.0E-03	na	2.2E-03	8.8E+00	9.0E-03	na	7.7E-02	2.8E-01	2.5E-04	na	2.2E-04	2.2E+00	2.3E-03	na	7.7E-03	2.2E+00	2.3E-03	na	7.7E-03
Demeton	0	--	1.0E-01	na	--	--	9.0E-01	na	--	--	2.5E-02	na	--	--	2.3E-01	na	--	--	2.3E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.4E+00	1.5E+00	na	--	4.3E-02	4.3E-02	na	--	3.4E-01	3.8E-01	na	--	3.4E-01	3.8E-01	na	--
Dibenz(a,h)anthracene[c]	0	--	--	na	1.8E-01	--	--	na	6.3E+00	--	--	na	1.8E-02	--	--	na	6.3E-01	--	--	na	6.3E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.4E+04	--	--	na	1.3E+02	--	--	na	1.4E+03	--	--	na	1.4E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.1E+04	--	--	na	9.6E+01	--	--	na	1.1E+03	--	--	na	1.1E+03
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	2.1E+03	--	--	na	1.9E+01	--	--	na	2.1E+02	--	--	na	2.1E+02
3,3-Dichlorobenzidine[c]	0	--	--	na	2.8E-01	--	--	na	9.8E+00	--	--	na	2.8E-02	--	--	na	9.8E-01	--	--	na	9.8E-01
Dichlorobromomethane[c]	0	--	--	na	1.7E+02	--	--	na	6.0E+03	--	--	na	1.7E+01	--	--	na	6.0E+02	--	--	na	6.0E+02
1,2-Dichloroethane[c]	0	--	--	na	3.7E+02	--	--	na	1.3E+04	--	--	na	3.7E+01	--	--	na	1.3E+03	--	--	na	1.3E+03
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.8E+04	--	--	na	7.1E+02	--	--	na	7.8E+03	--	--	na	7.8E+03
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.1E+05	--	--	na	1.0E+03	--	--	na	1.1E+04	--	--	na	1.1E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	3.2E+03	--	--	na	2.9E+01	--	--	na	3.2E+02	--	--	na	3.2E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[c]	0	--	--	na	1.5E+02	--	--	na	5.3E+03	--	--	na	1.5E+01	--	--	na	5.3E+02	--	--	na	5.3E+02
1,3-Dichloropropene[c]	0	--	--	na	2.1E+02	--	--	na	7.4E+03	--	--	na	2.1E+01	--	--	na	7.4E+02	--	--	na	7.4E+02
Dieldrin[c]	0	2.4E-01	5.6E-02	na	5.4E-04	1.9E+00	5.0E-01	na	1.9E-02	6.0E-02	1.4E-02	na	5.4E-05	4.8E-01	1.3E-01	na	1.9E-03	4.8E-01	1.3E-01	na	1.9E-03
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.8E+05	--	--	na	4.4E+03	--	--	na	4.8E+04	--	--	na	4.8E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	9.4E+03	--	--	na	8.5E+01	--	--	na	9.4E+02	--	--	na	9.4E+02
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.2E+07	--	--	na	1.1E+05	--	--	na	1.2E+06	--	--	na	1.2E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	5.0E+04	--	--	na	4.5E+02	--	--	na	5.0E+03	--	--	na	5.0E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.8E+04	--	--	na	5.3E+02	--	--	na	5.8E+03	--	--	na	5.8E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	3.1E+03	--	--	na	2.8E+01	--	--	na	3.1E+02	--	--	na	3.1E+02
2,4-Dinitrotoluene[c]	0	--	--	na	3.4E+01	--	--	na	1.2E+03	--	--	na	3.4E+00	--	--	na	1.2E+02	--	--	na	1.2E+02
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.6E-07	--	--	na	5.1E-09	--	--	na	5.6E-08	--	--	na	5.6E-08
1,2-Diphenylhydrazine[c]	0	--	--	na	2.0E+00	--	--	na	7.0E+01	--	--	na	2.0E-01	--	--	na	7.0E+00	--	--	na	7.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.8E+00	5.0E-01	na	9.8E+02	5.5E-02	1.4E-02	na	8.9E+00	4.4E-01	1.3E-01	na	9.8E+01	4.4E-01	1.3E-01	na	9.8E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.8E+00	5.0E-01	na	9.8E+02	5.5E-02	1.4E-02	na	8.9E+00	4.4E-01	1.3E-01	na	9.8E+01	4.4E-01	1.3E-01	na	9.8E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	1.8E+00	5.0E-01	--	--	5.5E-02	1.4E-02	--	--	4.4E-01	1.3E-01	--	--	4.4E-01	1.3E-01	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	9.8E+02	--	--	na	8.9E+00	--	--	na	9.8E+01	--	--	na	9.8E+01
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	6.9E-01	3.2E-01	na	6.6E-01	2.2E-02	9.0E-03	na	6.0E-03	1.7E-01	8.1E-02	na	6.6E-02	1.7E-01	8.1E-02	na	6.6E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.3E+00	--	--	na	3.0E-02	--	--	na	3.3E-01	--	--	na	3.3E-01

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	2.3E+04	--	--	na	2.1E+02	--	--	na	2.3E+03	--	--	na	2.3E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.5E+03	--	--	na	1.4E+01	--	--	na	1.5E+02	--	--	na	1.5E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.8E+04	--	--	na	5.3E+02	--	--	na	5.8E+03	--	--	na	5.8E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	9.0E-02	na	--	--	2.5E-03	na	--	--	2.3E-02	na	--	--	2.3E-02	na	--
Heptachlor[c]	0	5.2E-01	3.8E-03	na	7.9E-04	4.2E+00	3.4E-02	na	2.8E-02	1.3E-01	9.5E-04	na	7.9E-05	1.0E+00	8.6E-03	na	2.8E-03	1.0E+00	8.6E-03	na	2.8E-03
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	4.2E+00	3.4E-02	na	1.4E-02	1.3E-01	9.5E-04	na	3.9E-05	1.0E+00	8.6E-03	na	1.4E-03	1.0E+00	8.6E-03	na	1.4E-03
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	1.0E-01	--	--	na	2.9E-04	--	--	na	1.0E-02	--	--	na	1.0E-02
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	6.3E+03	--	--	na	1.8E+01	--	--	na	6.3E+02	--	--	na	6.3E+02
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	1.7E+00	--	--	na	4.9E-03	--	--	na	1.7E-01	--	--	na	1.7E-01
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	6.0E+00	--	--	na	1.7E-02	--	--	na	6.0E-01	--	--	na	6.0E-01
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	7.6E+00	--	na	6.3E+01	2.4E-01	--	na	1.8E-01	1.9E+00	--	na	6.3E+00	1.9E+00	--	na	6.3E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.2E+04	--	--	na	1.1E+02	--	--	na	1.2E+03	--	--	na	1.2E+03
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	1.2E+03	--	--	na	3.3E+00	--	--	na	1.2E+02	--	--	na	1.2E+02
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	1.8E+01	na	--	--	5.0E-01	na	--	--	4.5E+00	na	--	--	4.5E+00	na	--
Indeno (1,2,3-cd) pyrene[c]	0	--	--	na	1.8E-01	--	--	na	6.3E+00	--	--	na	1.8E-02	--	--	na	6.3E-01	--	--	na	6.3E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	3.4E+05	--	--	na	9.6E+02	--	--	na	3.4E+04	--	--	na	3.4E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Lead	0	4.3E+01	4.8E+00	na	--	3.4E+02	4.3E+01	na	--	1.1E+01	1.2E+00	na	--	8.6E+01	1.1E+01	na	--	8.6E+01	1.1E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	9.0E-01	na	--	--	2.5E-02	na	--	--	2.3E-01	na	--	--	2.3E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.1E+01	6.9E+00	--	--	3.5E-01	1.9E-01	--	--	2.8E+00	1.7E+00	--	--	2.8E+00	1.7E+00	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.7E+04	--	--	na	1.5E+02	--	--	na	1.7E+03	--	--	na	1.7E+03
Methylene Chloride[c]	0	--	--	na	5.9E+03	--	--	na	2.1E+05	--	--	na	5.9E+02	--	--	na	2.1E+04	--	--	na	2.1E+04
Methoxychlor	0	--	3.0E-02	na	--	--	2.7E-01	na	--	--	7.5E-03	na	--	--	6.8E-02	na	--	--	6.8E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Nickel	0	9.3E+01	1.0E+01	na	4.6E+03	7.4E+02	9.1E+01	na	5.1E+04	2.3E+01	2.5E+00	na	4.6E+02	1.9E+02	2.3E+01	na	5.1E+03	1.9E+02	2.3E+01	na	5.1E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	7.6E+03	--	--	na	6.9E+01	--	--	na	7.6E+02	--	--	na	7.6E+02
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	1.1E+03	--	--	na	3.0E+00	--	--	na	1.1E+02	--	--	na	1.1E+02
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	2.1E+03	--	--	na	6.0E+00	--	--	na	2.1E+02	--	--	na	2.1E+02
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	1.8E+02	--	--	na	5.1E-01	--	--	na	1.8E+01	--	--	na	1.8E+01
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.2E+02	5.9E+01	na	--	7.0E+00	1.7E+00	--	--	5.6E+01	1.5E+01	--	--	5.6E+01	1.5E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	5.2E-01	1.2E-01	na	--	1.6E-02	3.3E-03	na	--	1.3E-01	2.9E-02	na	--	1.3E-01	2.9E-02	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	1.3E-01	na	2.2E-02	--	3.5E-03	na	6.4E-05	--	3.2E-02	na	2.2E-03	--	3.2E-02	na	2.2E-03
Pentachlorophenol[c]	0	1.0E+01	7.7E+00	na	3.0E+01	8.0E+01	6.9E+01	na	1.1E+03	2.5E+00	1.9E+00	na	3.0E+00	2.0E+01	1.7E+01	na	1.1E+02	2.0E+01	1.7E+01	na	1.1E+02
Phenol	0	--	--	na	8.6E+05	--	--	na	9.5E+06	--	--	na	8.6E+04	--	--	na	9.5E+05	--	--	na	9.5E+05
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.4E+04	--	--	na	4.0E+02	--	--	na	4.4E+03	--	--	na	4.4E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	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	1.6E+02	4.5E+01	na	4.6E+04	5.0E+00	1.3E+00	na	4.2E+02	4.0E+01	1.1E+01	na	4.6E+03	**4.0E+01**	**1.1E+01**	**na**	**4.6E+03**
Silver	0	8.8E-01	--	na	--	7.0E+00	--	na	--	2.2E-01	--	na	--	1.8E+00	--	na	--	**1.8E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[c]	0	--	--	na	4.0E+01	--	--	na	1.4E+03	--	--	na	4.0E+00	--	--	na	1.4E+02	**--**	**--**	**na**	**1.4E+02**
Tetrachloroethylene[c]	0	--	--	na	3.3E+01	--	--	na	1.2E+03	--	--	na	3.3E+00	--	--	na	1.2E+02	**--**	**--**	**na**	**1.2E+02**
Thallium	0	--	--	na	4.7E-01	--	--	na	5.2E+00	--	--	na	4.7E-02	--	--	na	5.2E-01	**--**	**--**	**na**	**5.2E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.6E+04	--	--	na	6.0E+02	--	--	na	6.6E+03	**--**	**--**	**na**	**6.6E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene[c]	0	7.3E-01	2.0E-04	na	2.8E-03	5.8E+00	1.8E-03	na	9.8E-02	1.8E-01	5.0E-05	na	2.8E-04	1.5E+00	4.5E-04	na	9.8E-03	**1.5E+00**	**4.5E-04**	**na**	**9.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	3.7E+00	6.5E-01	na	--	1.2E-01	1.8E-02	na	--	9.2E-01	1.6E-01	na	--	**9.2E-01**	**1.6E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.7E+02	--	--	na	7.0E+00	--	--	na	7.7E+01	**--**	**--**	**na**	**7.7E+01**
1,1,2-Trichloroethane[c]	0	--	--	na	1.6E+02	--	--	na	5.6E+03	--	--	na	1.6E+01	--	--	na	5.6E+02	**--**	**--**	**na**	**5.6E+02**
Trichloroethylene[c]	0	--	--	na	3.0E+02	--	--	na	1.1E+04	--	--	na	3.0E+01	--	--	na	1.1E+03	**--**	**--**	**na**	**1.1E+03**
2,4,6-Trichlorophenol[c]	0	--	--	na	2.4E+01	--	--	na	8.4E+02	--	--	na	2.4E+00	--	--	na	8.4E+01	**--**	**--**	**na**	**8.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[c]	0	--	--	na	2.4E+01	--	--	na	8.4E+02	--	--	na	2.4E+00	--	--	na	8.4E+01	**--**	**--**	**na**	**8.4E+01**
Zinc	0	6.0E+01	5.9E+01	na	2.6E+04	4.8E+02	5.3E+02	na	2.9E+05	1.5E+01	1.5E+01	na	2.6E+03	1.2E+02	1.3E+02	na	2.9E+04	**1.2E+02**	**1.3E+02**	**na**	**2.9E+04**

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	7.0E+02
Arsenic	2.0E+02
Barium	na
Cadmium	8.1E-01
Chromium III	5.1E+01
Chromium VI	1.3E+01
Copper	5.1E+00
Iron	na
Lead	6.5E+00
Manganese	na
Mercury	1.0E+00
Nickel	1.4E+01
Selenium	6.8E+00
Silver	7.0E-01
Zinc	4.8E+01

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

5/7/2013 1:14:11 PM

Facility = Craig Springs Camp - VA0027952
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 49.2
WLAc = 15.5
Q.L. = 0.2
# 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

5/7/2013 1:16:50 PM

Facility = Craig Springs Camp - VA0027952
Chemical = TRC
Chronic averaging period = 4
WLAa = 38
WLAc = 25
Q.L. = 0.1
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 4000
Variance = 5760000
C.V. = 0.6
97th percentile daily values = 9733.67
97th percentile 4 day average = 6655.16
97th percentile 30 day average= 4824.21
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 36.5643696013308
Average Weekly limit = 21.8108324300024
Average Monthly LImit = 18.1220754178995

The data are:

4000

"Model Run For C:\Users\pvu61777\Documents\000_kaharlow\Craig_Springs Camp - VA0027952\VA0027952_13\Technical\DOModel.mod On 5/7/2013 1:36:26 PM"

"Model is for GRANNY CREEK."
"Model starts at the CRAIG SPRINGS CAMP AND CONFERENCE CENTER - VA0027952 discharge."

"Background Data"

"7Q10",	"cBOD5",	"TKN",	"DO",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
.0788,	2,	0,	7.448,	21.4

"Discharge/Tributary Input Data for Segment 1"

"Flow",	"cBOD5",	"TKN",	"DO",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
.01,	25,	12,	,5,	20

"Hydraulic Information for Segment 1"

"Length",	"Width",	"Depth",	"Velocity"
"(mi)",	"(ft)",	"(ft)",	"(ft/sec)"
1,	8.002,	.056,	.306

"Initial Mix Values for Segment 1"

"Flow",	"DO",	"cBOD",	"nBOD",	"DOSat",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
.0888,	7.173,	11.472,	4.386,	8.337,	21.24242

"Rate Constants for Segment 1. - (All units Per Day)"

"k1",	"k1@T",	"k2",	"k2@T",	"kn",	"kn@T",	"BD",	"BD@T"
1.2,	1.27,	20,	20.598,	.45,	.495,	0,	0

"Output for Segment 1"
"Segment starts at CRAIG SPRINGS CAMP AND CONFERENCE CENTER - VA0027952"

"Total",	"Segm."			
"Dist.",	"Dist.",	"DO",	"cBOD",	"nBOD"
"(mi)",	"(mi)",	"(mg/l)",	"(mg/l)",	"(mg/l)"
0,	0,	7.173,	11.472,	4.386
.1,	.1,	7.295,	11.185,	4.343
.2,	.2,	7.382,	10.905,	4.3
.3,	.3,	7.445,	10.632,	4.258
.4,	.4,	7.493,	10.366,	4.216
.5,	.5,	7.503,	10.106,	4.175
.6,	.6,	7.503,	9.853,	4.134
.7,	.7,	7.503,	9.606,	4.093
.8,	.8,	7.503,	9.365,	4.053
.9,	.9,	7.503,	9.13,	4.013
1,	1,	7.503,	8.901,	3.974

"END OF FILE"

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to GRANNY CREEK.

File Information

File Name:	C:\Users\pvu61777\Documents\000_kaharlow\Craig_Springs Camp - VA
Date Modified:	May 07, 2013

Water Quality Standards Information

Stream Name:	GRANNY CREEK
River Basin:	James River Basin
Section:	12
Class:	VI - Natural Trout Waters
Special Standards:	None

Background Flow Information

Gauge Used:	Johns Creek at New Castle Gage (2-JOB000.39)
Gauge Drainage Area:	104 Sq.Mi.
Gauge 7Q10 Flow:	5 MGD
Headwater Drainage Area:	1.64 Sq.Mi.
Headwater 7Q10 Flow:	7.884616E-02 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	4.807692E-02 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	21.4 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0 mg/l
Background D.O.:	7.448122 mg/l

Model Segmentation

Number of Segments:	1
Model Start Elevation:	1900 ft above MSL
Model End Elevation:	1660 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to GRANNY CREEK.

Segment Information for Segment 1

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	CRAIG SPRINGS CAMP AND CONFERENCE CENTER - VA0027952
VPDES Permit No.:	VA0027952

Discharger Flow Information

Flow:	0.01 MGD
cBOD5:	25 mg/l
TKN:	12 mg/l
D.O.:	5 mg/l
Temperature:	20 Degrees C

Geographic Information

Segment Length:	1 miles
Upstream Drainage Area:	1.64 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	1900 Ft.
Downstream Elevation:	1660 Ft.

Hydraulic Information

Segment Width:	8.002 Ft.
Segment Depth:	0.056 Ft.
Segment Velocity:	0.306 Ft./Sec.
Segment Flow:	0.089 MGD
Incremental Flow:	-0.079 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular
Character:	Mostly Straight
Pool and Riffle:	No
Bottom Type:	Large Rock
Sludge:	None
Plants:	None
Algae:	None