VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a minor, industrial permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260. The industrial discharge results from the emergency overflows and clearwell draining at a water treatment plant.

1. Facility Name and Address: Henrico Water Treatment Plant, 10111 Three Chopt Road, Richmond, Virginia 23233 — SIC: 4941

   Location: 10111 Three Chopt Road

2. Permit No. VA0091197

3. Owner Contact: Name: Mr. Arthur Petrini
   Title: DPU Director
   Telephone No: (804) 501-4280

4. Application Complete Date: January 7, 2008
   DEQ Regional Office: Piedmont Regional Office
   Permit Drafted By: Gina Kelly — Date: October 19, 2007; revised January 4, 2008; January 8, 2008; February 11, 2008; April 9, 2008
   Reviewed By: Ray Jenkins — Date: December 18, 2007
   Curt Linderman — Date: January 7, 2008

5. Receiving Stream Name: Unnamed Tributary to Deep Run
   River Mile: 2-XVY000.16
   Basin: James River (Middle)
   Subbasin: N/A
   Section: 9a
   Class: III
   Special Standards: PWS, o
   7-Day, 10-Year Low Flow: 0.0 MGD — 30-Day, 5-Year Low Flow: 0.0 MGD
   1-Day, 10-Year Low Flow: 0.0 MGD — Harmonic Mean Flow: 0.0 MGD

6. Operator License Requirements: Not Required

7. Reliability Class: Not Applicable

8. Permit Characterization:

( ) Issuance
(X) Reissuance
( ) Owner Modification
( ) Board Modification

( ) Municipal
SIC Code(s)
(X) Industrial
SIC Code(s) 4941
( ) POTW
( ) PVOTW
(X) Publicly-Owned Industrial
( ) State

(X) Existing Discharge
( ) Proposed Discharge
( ) Effluent Limited
(X) Water Quality Limited
( ) Interim Limits in Permit
( ) Interim Limits in Other Document
( ) Compliance Schedule Required
( ) Site Specific WQ Criteria
( ) Variance to WQ Standards
( ) Water Effects Ratio
( ) Discharge to 303(d) Listed Segment
( ) Storm Water Management Plan
( ) Pretreatment Program Required

9. Wastewater Flow and Treatment: Table I

OUTFALL NUMBER	DISCHARGE SOURCE	TREATMENT	FLOW
001	(a) Emergency overflows of potable water from finished water clearwell. (b) Emergency overflows from raw water inlet (c) Emergency overflows from filter inlet channel (d) Emergency overflows from wash-water reclamation tanks (e) Draining of clearwell cell (f) Underdrains from WTP	Re-aeration, volatilization and sedimentation in detention basin	(a) 700,000 gals. (b) 700,000 gals. (c) 700,000 gals. (d) 144,000 gals. (e) 100,000 gals. (f) 24,000 gal/day

See **Attachment A** for a facility diagram.

The detention basin at the Henrico Water Treatment Plant is located at the southwest corner of the plant site and receives stormwater and process water from the site. The basin has a capacity of 0.77 MG with an expected hydraulic retention residence time of greater than 60 hours. Stormwater flow and discharge duration are rainfall dependent. The basin is significantly oversized for stormwater management providing excess storage capacity for the potential flows (a) to (f) detailed in Table I which are routed to the basin for treatment.

The overflows (a) through (d) assume an occurrence of 1/year and duration of 15 to 30 minutes for each overflow (total of 4 overflows per year). The clearwell cell is drained for inspection/maintenance once every 5 to 10 years. This permit reissuance addresses discharge (a) through (e) due to the potential impact that they might have on the receiving stream when discharged from the detention basin through Outfall 001.

Staff has not identified any concerns regarding item (f)-groundwater from the underdrain collection system around the building foundations that is routed to the detention basin and the expected quality of the stormwater from the subject industrial activity. As the standard stormwater permit language allows non-stormwater discharges, including discharges from uncontaminated groundwater and foundation or footing drains where flows are not contaminated with process materials, discharges from the basin containing commingled stormwater and groundwater from the underdrain system are not considered process water discharges and do not require Part I.A. monitoring or DMR submittal.

10. Sludge Disposal: N/A

11. Discharge Location Description: Unnamed Tributary to Deep Run
Name of USGS topo map: Glen Allen — 127A (See **Attachment B**)

12. Material Storage: Several chemicals are stored onsite including: aluminum sulfate, ammonia, calcium thiosulfate, coagulant and filter aid polymers, hydrofluosilicic acid, oxygen, potassium orthophosphate, sodium hydroxide, sodium hypochlorite, and diesel fuel oil. All materials are appropriately stored with proper spill containment. A table detailing the types of chemicals, volume, and storage is included in **Attachment D** with the site visit report.

13. Antidegradation Review & Comments:
Tier: I __X__; II____; III____
The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect those uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards.

Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with a Tier determination. The receiving stream, an unnamed tributary to the Deep Run Creek, is determined to be a Tier I waterbody. This determination is based on the intermittent nature of the stream where beneficial uses cannot be fully attained. However, the discharge point is 0.16 mile upstream of a perennial stream (Deep Run Creek); Deep Run Creek is a Tier II stream. In order to be protective of both the immediate receiving stream and the perennial stream, reasonable potential analyses were performed using both Tier I and Tier II protocols. See the Flow Frequency Determination in Attachment E for more information.

14. Ambient Water Quality Information: The UT Deep Run Creek has a 1Q10 and a 7Q10 of 0 MGD, thus the theoretical flow is comprised totally of effluent. Under these low flow conditions, the ambient data are not applicable for worst-case modeling; instead, effluent data from the permit application were used to analyze permit limitations under the Tier I scenario. Ambient water quality data from Deep Run Creek, near Raintree Drive, at river mile 2-DPR002.46 was used in this analysis for the Tier II evaluation. See **Attachment C**.

15. Site Inspection: Date: January 30, 2008 Performed by: Gina Kelly and Ray Jenkins
See **Attachment D**.

16. Effluent Screening & Limitation Development:

The permittee estimated values for those pollutants believed to be present in the effluent data. The effluent data reported are summarized below:

Parameter	Reported Value
pH Minimum	7.0 S.U
pH Maximum	7.5 S.U.
Temperature Summer	27 °C
Temperature Winter	7 °C
BOD (intake)	2 mg/L
COD (intake)	2 mg/L
TOC (intake)	5 mg/L
TSS (intake)	<10 mg/L
Ammonia	5 µg/L
TRC	15 µg/L
Iron	500 µg/L
Manganese	25 µg/L
Total Phosphorus	200 µg/L

The Permit Manual suggests all WTPs sample for various metals (including cadmium, chromium, copper, lead, mercury, and zinc). As the values for these parameters are site-specific, providing estimated values is difficult; therefore, the sampling is differed until the permittee submits the EPA Form 2C, Parts V and VI in accordance with item Part I.B.10 of the permit.

No WQS for Total Phosphorus currently exists; therefore this parameter was not evaluated further.

Reasonable Potential Analyses for Pollutants of Concern: Iron and Manganese
The MSTRANTI printouts calculated a WLA for these parameters which were believed to be present in this facility's effluent. The Human Health WLAs were established based on the applicable human health standards.

Parameter	Reported Value	$WLA_{Tier\ I}$	$WLA_{Tier\ II}$
Iron	500 µg/L	300 µg/L	31 µg/L
Manganese	25 µg/L	50 µg/L	5.2 µg/L

The estimated effluent total metals concentration for iron reported in the permit application exceeds that WLA in both Tier scenarios; the manganese estimate exceeds the WLA in the Tier II situation. At times, the permittee may be adding potassium permanganate to the river supply water to aid in manganese removal in the water treatment plant. During those times, an overflow at the raw water inlet would convey manganese to the detention basin.

Significant mixing is expected to occur in the basin given the configuration of the outfall structure and the volume of water required to be discharged to establish the nature of the wastewater (process water versus stormwater). As no actual effluent data is currently available, monitoring for these parameters is considered more appropriate than a limitation at this time. Should the monitoring data indicate that an effluent limitation is necessary, the permit can be reopened to establish an appropriate limitation. The permit therefore requires monitoring for both parameters.

The monitoring frequency of 1/Month is based on BEJ.

Reasonable Potential Analyses for Pollutants of Concern: Ammonia and TRC
Attachment E provides the evaluations for ammonia and TRC. Also included in Attachment E are the Flow Frequency Determination, MIX.exe, WLA calculations (MSTRANTI) and STATS.exe analyses.

With respect to MSTRANTI inputs, please note the following:

<table>
<tr><th colspan="3">Stream Information</th></tr>
<tr><td>Mean Hardness</td><td rowspan="4">Tier I: Effluent data reported in EPA Form 2C</td><td rowspan="4">Tier II: Ambient Monitoring Station data (See Attachment C)</td></tr>
<tr><td>90% Temperature</td></tr>
<tr><td>90% Maximum pH</td></tr>
<tr><td>10% Maximum pH</td></tr>
<tr><td>Tier Designation</td><td colspan="2">Tier determination</td></tr>
<tr><th colspan="3">Stream Flows</th></tr>
<tr><td>All Data</td><td colspan="2">Flow frequency determination (See Attachment E); see also discussion in Item #13 above.</td></tr>
<tr><th colspan="3">Mixing Information</th></tr>
<tr><td>All Data</td><td colspan="2">Established at 100% based on Mixing Model requirements</td></tr>
</table>

Effluent Information	
Mean Hardness	25 mg/L is the minimum hardness recognized by MSTRANTI.
90% Temperature	Application data (See Attachment F)
90% Maximum pH	
10% Maximum pH	
Discharge Flow	For a surface water discharge of process water to occur, a single, or multiple overflow event must occur when the basin is already full, or partially full, due to a previous overflow or precipitation event. As the potential for multiple emergency overflow events to occur simultaneously is minimal, the highest volume listed in Table I above was used for limit calculations based on best engineering judgment (BEJ). In lieu of actual effluent flow data, this flow is most representative of the "actual" flow which is to be used in the derivation of limits for industrial permits.

Table II. Effluent Limitations Summary

PARAMETER	BASIS FOR LIMITS*	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
FLOW (MGD)	NA	NL	NA	NA	NL	1/Month	Estimate
PH (s.u.)	1	NA	NA	6.0	9.0	1/Month	Grab
TSS (mg/L)	2	30	NA	NA	60	1/Month	Grab
Ammonia (mg/L)	2	4.0	NA	NA	4.0	1/Month	Grab
Total Residual Chlorine (mg/L)	1	0.0041	NA	NA	0.0041	1/Month	Grab
Dissolved Iron (mg/L)	2	NL	NA	NA	NL	1/Month	Grab
Dissolved Manganese (mg/L)	2	NL	NA	NA	NL	1/Month	Grab

1. Water Quality-based Effluent Limitations
2. Best Engineering Judgment (BEJ)

17. Antibacksliding Statement: All limitations in the proposed permit are the same or more stringent than the limitations in the existing permit.

18. Schedule of Compliance – Part I.C: The Virginia Water Quality Standards, 9 VAC 25-260, and the corresponding Water Quality Effluent Limitations analyses indicated the need to reevaluate the limitations for TRC. Analysis of effluent data indicated the need to establish more stringent effluent limitations for TRC. As these are more restrictive effluent limitations, it is appropriate to allow a period of time for the permittee to achieve compliance. However, both the previous limitation and the revised limitation are less than the quantification limitation for the parameter; compliance with the former limitation indicates compliance with the new limitation. Accordingly, no additional time is needed to achieve compliance. Consequently, a compliance schedule for this parameter was not given.

A compliance schedule was given for the new bacterial count limitation. The VPDES Permit Regulation at 9 VAC 25-31-250 allows for schedules that will lead to compliance with the Clean Water Act, the State Water Control Law, and regulations promulgated under them.

19. Special Conditions:

B1. Discharge Monitoring Clarification

Rationale: This special condition clarifies the applicability of the limitations established in Part I.A of the permit. The limitations and monitoring requirements in Part I. A. will only apply to discharges from the detention basin which are considered process water; waters discharged considered to be stormwater do not require monitoring. The permittee is also required to submit the DMR and Form A form on a monthly basis to affirm that no process waters have been discharged into the detention basin.

B2. O&M Manual Requirement

Rationale: Required by Code of Virginia § 62.1-44.16; VPDES Permit Regulation, 9 VAC 25-31-190 E, and 40 CFR 122.41(e). These laws require proper operation and maintenance of the permitted facility. Compliance with an approved O&M manual ensures these requirements are met.

B3. Materials Handling/Storage

Rationale: 9 VAC 25-31-50 A prohibits the discharge of any wastes into State waters unless authorized by permit. Code of Virginia § 62.1-44.16 and 62.1-44.17 authorizes the Board to regulate the discharge of industrial waste or other waste.

B4. Water Quality Standards Reopener

Rationale: VPDES Permit Regulation, 9 VAC 25-31-220 D requires effluent limitations to be established which will contribute to the attainment or maintenance of the water quality standards.

B5. Compliance Reporting

Rationale: Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limitation or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

B6. Ground Water Monitoring-Reopener

Rationale: State Water Control Law § 62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. Ground water monitoring for parameters of concern will indicate whether possible lagoon seepage is resulting in violations to the State Water Control Board's Ground Water Standards.

B7. Notifications

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 A for all manufacturing, commercial, mining, and silvicultural dischargers.

B8. TMDL Reopener

Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The re-opener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed it they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act.

B9. Closure Plan
Rationale: VPDES Permit Regulation, 9 VAC 25-31 et seq requires the submittal of a closure plan when operations at a facility cease.

B.10 Form 2C
Rationale: The permit limitations are based on assumed effluent quality characteristics when no release of identified process wastewaters has occurred. These assumptions (and the permit basis) can only be validated with actual effluent data. The submission of actual data is required in the application form instructions.

Part II. Conditions Applicable to All Permits.
Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

20. NPDES Permit Rating Work Sheet: Total Score 70 (See **Attachment F**)

21. Changes to Permit:

Parameter Changed	Effluent Limits Changed		Monitoring Requirement Changed		Reason for Change	Date
	From	To	From	To		
TRC	0.016 mg/L	0.0041 mg/L	-	-	Re-evaluation indicates the need to revise TRC limitations.	1/08
All parameters (excluding *E.coli*)	-	-	1/Discharge	1/Month	To be more consistent with other WTP VPDES permits	1/08
E.coli	-	NL	-	1/Month	EPA and the State Water Control Board adopted a bacterial TMDL which included an *E.coli* allocation for this facility (see Attachment H and discussion in Item 24 below)	2/08
E.coli	-	1.22E12	-	1/Year		2/08
The cover page was revised in accordance with current guidance and DEQ policy.						
Changes Made in Response to Public Comment Submitted April 3, 2008						
The *E.coli* limitations added in February 2008 were removed from the permit. DEQ staff are working with EPA to revised the TMDL to move the allocation from this point source to "future growth" and MS4s in the watershed.						

From	To	Special Condition Changed	Reason for Change	Date
	Part I.A.3	Sample Location	New, reflects current agency guidance	1/08
Part I.A.	Part I.A	Monitoring Frequency: 1/Discharge to 1/Month	The detention basin was to be reconfigured as an infiltration system, and any process water discharged into the basin was to be monitoring in accordance with Part I.A until the basin drained dry. However, the reconfiguration did not occur, and basin holds water at the level of the overflow standpipe. The B.1 special condition was revised to reflect this actuality and requires that Part I.A. monitoring be performed for all discharges identified as process water. Once process water has entered the basin, the monitoring commences and does not stop until the basin has discharged the	1/08
Part I.B.1	Part I.B.1	Discharge Monitoring Clarification		

From	To	Special Condition Changed	Reason for Change	Date
			appropriate amount of water, as defined in the permit. Also, the monitoring frequency was revised in consideration of the new monitoring scenario.	
Part I.B.2	Part I.B.2	O&M Manual Requirement	Revised in accordance with current agency guidance and policy	1/08
Part I.B.5	Part I.B.5	Compliance Reporting	Revised in accordance with current agency guidance and policy	1/08
	Part I.B.7	Notifications	New, reflects current agency guidance	1/08
	Part I.B.8	TMDL Reopener	New, reflects current agency guidance	1/08
	Part I.B.9	Closure Plan	New, reflects current agency guidance	1/08
Part I.B.6	Part I.B.10	Form 2C Requirements	Revised to reflect the process that needs to occur once process wastewater is discharged	1/08
		Form A	Revised to include discharge volume as one of the reported parameters; previously referred to as "Attachment A."	1/08
	Part I.C	Schedule of Compliance	New, to allow adequate time to achieve new bacteria limitations	2/08
Changes Made in Response to Public Comment Submitted April 3, 2008				
Part I.A. footnote (3), Part I.B.1.e, and Part I.C were removed as the associate bacteria limitation and monitoring requirements were removed from the permit.				

22. Variances/Alternate Limits or Conditions:
Groundwater monitoring is typically required around wastewater treatment basins. The influents to the basin in this case however, are relatively clean in regards to pollutant loads to be removed and treated in the basin. Four (4) emergency overflows are assumed per year. Ammonia, Total Residual Chlorine (TRC), and manganese have the potential of being present in the influent to the detention basin. Ammonia and TRC are of concern because of their impact at very low concentration on aquatic life but are expected to volatilize in the basin. Manganese is expected to be at a concentration of 0.025 mg/L (Ground Water Quality Standard for manganese is 0.05 mg/L). Groundwater monitoring is therefore deemed initially not to be necessary. A permit reopener however was tailored requiring the permittee to develop a groundwater monitoring program if so directed by the staff and included in the permit.

Additionally, The permittee requested a waiver from the Form 2C testing requirements for BOD, COD, TSS, TOC and iron. The waiver was granted by DEQ on January 7, 2008 (see **Attachment G**).

23. Public Notice Information required by 9 VAC 25-31-280 B:
Publishing Newspaper: *Richmond Times- Dispatch*
Comment period: Publication Dates: March 5 and 12, 2008
Start Date: March 6, 2008 End Date: April 7, 2008

All pertinent information is on file and may be inspected or copied by contacting Gina Kelly at:

Virginia Department of Environmental Quality (DEQ)
Piedmont Regional Office
4949-A Cox Road
Glen Allen, Virginia 23060-6296

Telephone Number 804/527-5048
Facsimile Number 804/527-5106
Email vekelly@deq.virginia.gov

Persons may comment in writing or by e-mail to the DEQ on the proposed modification of the permit, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within the comment period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing, and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action.

Following the comment period, the Board will make a determination regarding the proposed modification. That determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

24. Additional Comments:

a. Previous Board Action: None

b. Staff Comments:

- The basis for the iron and manganese quantification levels included in the permit (Part I.B.5) is reflective of the Human Health PWS waste load allocation.
- While discharges from the basins due to stormwater or under drain sources have occurred, no release of process wastewaters has been reported; consequently no effluent data has been submitted. Additionally, the facility has received Warning Letters during the last permit term. Therefore, reduced monitoring is not appropriate at this time.
- This facility discharges to a receiving stream section with the special standards "o," and "PWS." Special standard "o" involves sanitary sewage; the facility treats and discharges only industrial wastewater; all sanitary sewage is sent to the Henrico County Water Reclamation Facility (VA0063690). A reasonable potential analysis was performed for all PWS pollutants, and additional limitations were deemed unnecessary.
- This facility does not currently have coverage under the Watershed Nutrient General Permit. This facility is not currently considered a significant discharger of nutrients to the Chesapeake Bay per the definition of "significant discharger" established in 9 VAC 25-720; under the most extreme conditions (i.e. simultaneous overflows from all emergency overflow points), the resulting loads are less than the equivalent loads of a significant discharger. As the facility has not proposed an expansion or upgrade to the wastewater treatment facilities at this time, further evaluation of nutrients is not necessary.
- To appropriately cover all chemical additions at the raw water intake structure, the language in Part I.B.1.a was revised after the public notice period concluded. The updated special condition reads "...Raw Water Inlet if *any chemicals* have been added...." This revision was approved by the permittee via email on April 11, 2008.
- This permit expired prior to reissuance due to the required TMDL revision that was not completed by Central Office TMDL staff until May 28, 2009. See **Attachment H**.
- A bacterial TMDL, which included an E.coli allocation for this facility, was approved during the 2003 permit term. In order to be in compliance with all applicable planning regulations and documents, a limitation for the TMDL parameter must be included in the permit. As this facility does not treat municipal, sanitary wastewaters, but rather industrial wastewaters, an alternative manner in which to demonstrate compliance with the bacterial annual load allocation was developed and incorporated into the February 11, 2008 draft permit. The permittee submitted a comment during the public notice period requesting that the bacteria limitations included in the draft permit be removed as the facility is an industrial facility and is not a source of bacteria into the detention pond. DEQ staff consulted with EPA, and the TMDL

was revised to move the allocation from this point source to "future growth" and MS4s in the watershed. See Attachment H.

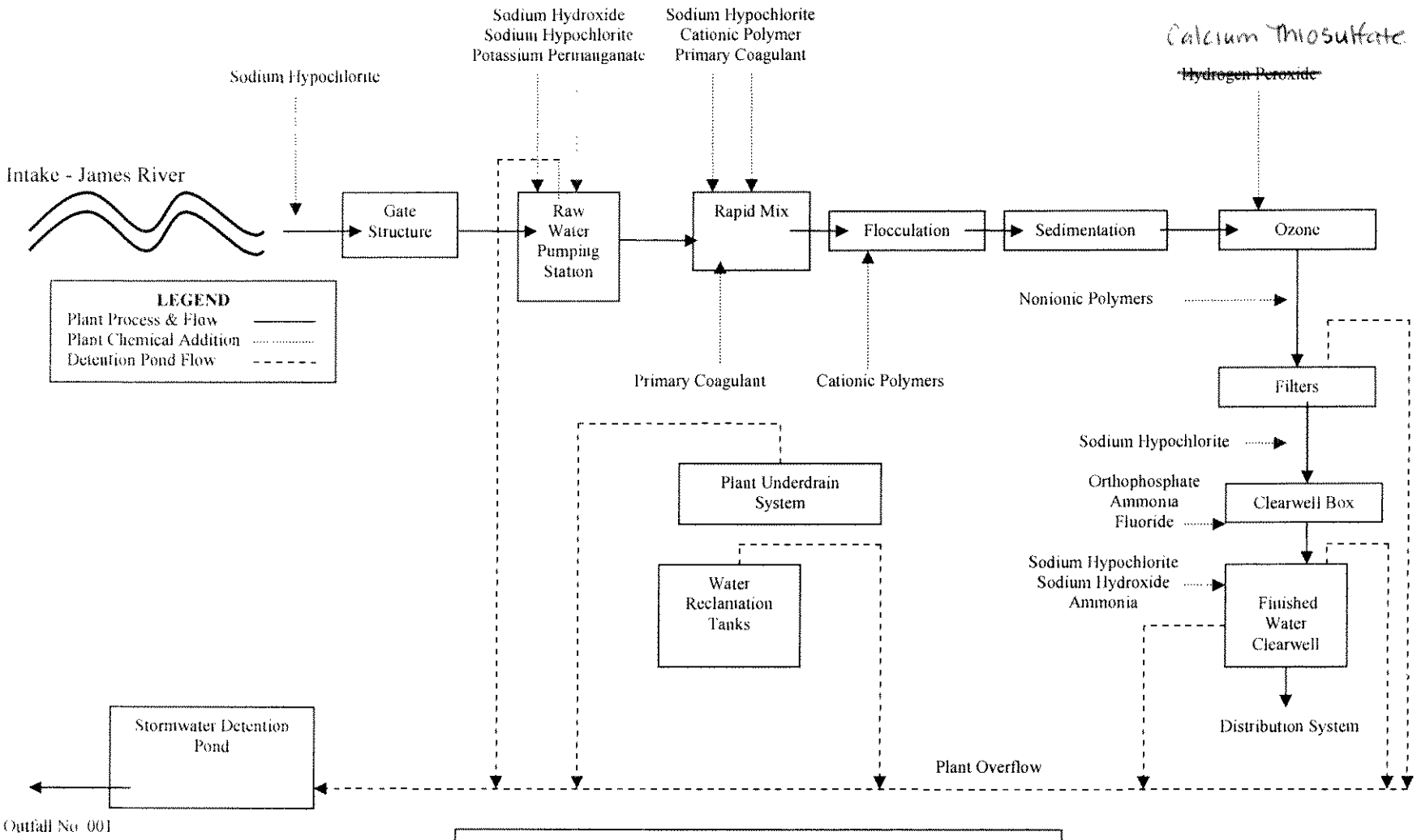
c. Public Comment: One public comment was received from the permittee, Henrico County; see the discussion in the preceding bullet.

25. Summary of specific attachments labeled as:

Attachment A Facility Diagram
Attachment B Topographic Map
Attachment C Ambient Stream Data
Attachment D Site Inspection/Visit
Attachment E Effluent Limitation Development
Attachment F NPDES Industrial Permit Rating Worksheet
Attachment G Application Waiver
Attachment H TMDL

Attachment A

Facility Diagram



II A. Line Diagram Henrico County Water Treatment Facility

Attachment B

Topographic Map

0 0.3 0.6 0.9 1.2 1.5 km

0 0.2 0.4 0.6 0.8 1 mi

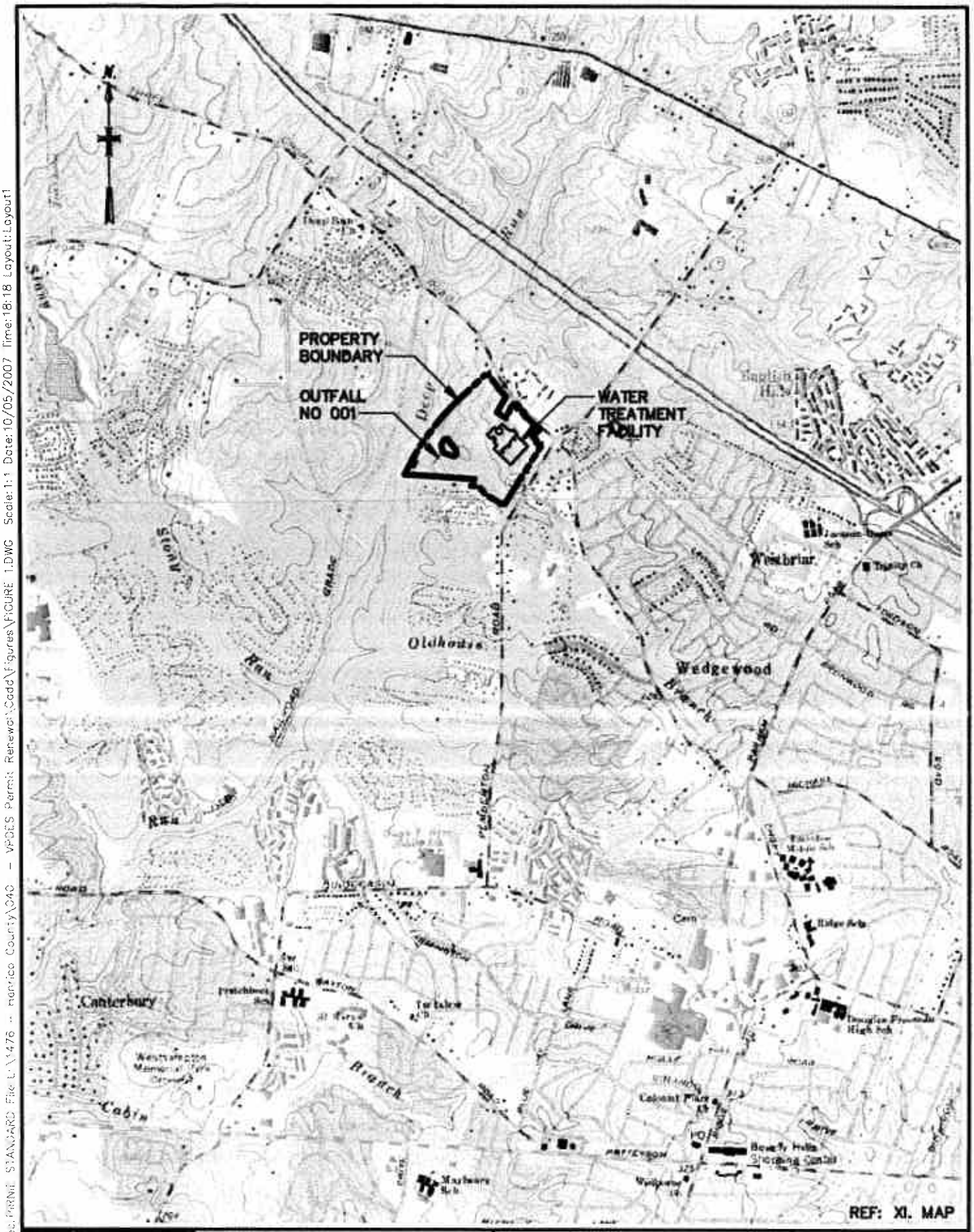
M*

M=-9.998
G=-1.577

37° 37' 34"N, 77° 34' 54"W (NAD83/WGS84)

USGS Glen Allen (VA) Quadrangle

Projection is UTM Zone 18 NAD83 Datum



MALCOLM PIRNIE	HENRICO COUNTY DEPARTMENT OF PUBLIC UTILITIES	HENRICO COUNTY WATER TREATMENT FACILITY FACILITY MAP SCALE: 1" = 2000'	MALCOLM PIRNIE, INC. OCTOBER 2007 FIGURE 1

User: Cutler Spec: PIRNIE STANDARD File L:\1476 - Henrico County\040 - VPDES Permit Renewal\Cadd\Figures\FIGURE 1.DWG Scale:1:1 Date:10/05/2007 Time:18:18 Layout:Layout1

Attachment C

Ambient Stream Data

						00900 HARDNESS, TOTAL (MG/L AS CACO3)	
Sta Id	Collection Date Time	Depth Desc	Depth	Container Id Desc	Comment	Value	Com Code
2-DPR002.46	07/08/1997 15:05	S	0.3	R	STORET DATA CONVERSION	50.9	
	08/20/1997 10:30	S	0.3	R	STORET DATA CONVERSION	24.6	
	09/18/1997 12:44	S	0.3	R	STORET DATA CONVERSION	52.9	
	10/30/1997 14:14	S	0.3	R	STORET DATA CONVERSION	43.0	
	11/25/1997 15:11	S	0.3	R	STORET DATA CONVERSION	54.5	
	12/22/1997 12:44	S	0.3	R	STORET DATA CONVERSION	49.1	
	01/20/1998 12:33	S	0.3	R	STORET DATA CONVERSION	36.6	
	02/18/1998 10:45	S	0.3	R	STORET DATA CONVERSION	19.1	
	03/24/1998 12:20	S	0.3	R	STORET DATA CONVERSION	38.2	
	04/23/1998 15:20	S	0.3	R	STORET DATA CONVERSION	36.5	
	05/14/1998 16:50	S	0.3	R	STORET DATA CONVERSION	40.2	
	06/15/1998 15:30	S	0.3	R	STORET DATA CONVERSION	33.9	
	07/07/1998 12:30	S	0.3	R	STORET DATA CONVERSION	46.0	
	08/12/1998 11:00	S	0.3	R	STORET DATA CONVERSION	54.9	
	09/10/1998 11:05	S	0.3	R	STORET DATA CONVERSION	49.5	
	10/14/1998 11:00	S	0.3	R	STORET DATA CONVERSION	80.0	
	11/23/1998 13:30	S	0.3	R	STORET DATA CONVERSION	67.0	
	12/07/1998 12:20	S	0.3	R	STORET DATA CONVERSION	70.0	
	01/12/1999 11:40	S	0.3	R		64.0	
	02/10/1999 11:35	S	0.3	R		66.0	
	03/03/1999 10:40	S	0.3	R		62.0	
	04/01/1999 11:11	S	0.3	R		56.0	
	05/17/1999 15:00	S	0.3	R		88.0	
	06/24/1999 11:52	S	0.3	R		48.8	
	07/08/1999 14:11	S	0.3	R		35.1	
	08/10/1999 13:05	S	0.3	R		48.1	
	09/15/1999 13:00	S	0.3	R		34.9	
	11/22/1999 13:00	S	0.3	R	FLOW NORMAL	58.1	
	12/27/1999 10:00	S	0.3	R		51.3	
	02/15/2000 10:50	S	0.3	R		81.7	
	03/14/2000 11:05	S	0.3	R	FLOW NORMAL	56.0	
	04/11/2000 11:10	S	0.3	R		43.0	
	05/18/2000 10:30	S	0.3	R		54.0	
	06/13/2000 10:50	S	0.3	R		47.9	
	07/12/2000 11:30	S	0.3	R		49.0	
	08/01/2000 12:30	S	0.3	R	FLOW ABOVE NORMAL	44.3	
	09/07/2000 13:15	S	0.3	R		41.5	
	10/05/2000 11:25	S	0.3	R	"	49.9	
	11/08/2000 12:05	S	0.3	R		43.8	
	12/20/2000 10:35	S	0.3	R		46.0	
	01/10/2001 11:15	S	0.3	R	NORMAL FLOW	63.9	
	02/21/2001 13:00	S	0.3	R	NORMAL FLOW	53.3	
	03/19/2001 10:20	S	0.3	R		39.5	
	04/18/2001 11:45	S	0.3	R		18.5	

Average **49.8**

Station ID	Collection Date	Depth Desc	Depth	Temp Celcius	Field Ph	Do Probe	Salinity
2-DPR002.46	5/27/1997	S	.30	16.17	6.18	6.22	
2-DPR002.46	6/12/1997	S	.30	20.36	6.57	5.95	
2-DPR002.46	6/26/1997	S	.30	26.33	6.50	4.20	
2-DPR002.46	7/8/1997	S	.30	23.99	6.58	3.37	.00
2-DPR002.46	8/20/1997	S	.30	22.17	6.18	6.53	
2-DPR002.46	9/18/1997	S	.30	20.87	6.72	3.92	
2-DPR002.46	10/30/1997	S	.30	10.07	6.52	8.64	
2-DPR002.46	11/25/1997	S	.30	6.26	6.52	10.31	
2-DPR002.46	12/22/1997	S	.30	5.19	6.68	10.38	
2-DPR002.46	1/20/1998	S	.30	5.73	7.09	11.00	
2-DPR002.46	2/18/1998	S	.30	9.83	6.48	9.76	
2-DPR002.46	3/24/1998	S	.30	10.47	6.70	11.18	
2-DPR002.46	4/23/1998	S	.30	16.09	6.91	9.00	
2-DPR002.46	5/14/1998	S	.30	20.17	6.82	7.67	
2-DPR002.46	6/15/1998	S	.30	25.99	6.71	6.61	
2-DPR002.46	7/7/1998	S	.30	24.25	6.73	2.66	
2-DPR002.46	8/12/1998	S	.30	23.40	7.00	1.88	
2-DPR002.46	9/10/1998	S	.30	18.51	6.57	5.09	
2-DPR002.46	10/14/1998	S	.30	16.33	6.52	5.05	
2-DPR002.46	11/23/1998	S	.30	8.27	6.39	6.32	
2-DPR002.46	12/7/1998	S	.30	14.88	6.38	4.27	
2-DPR002.46	1/12/1999	S	.30	3.70	6.42	10.76	
2-DPR002.46	2/10/1999	S	.30	7.73	6.39	10.25	
2-DPR002.46	3/3/1999	S	.30	8.24	6.35	9.78	.10
2-DPR002.46	4/1/1999	S	.30	14.00	6.94	8.52	
2-DPR002.46	5/17/1999	S	.30	17.60	6.90	6.20	
2-DPR002.46	6/24/1999	S	.30	19.50	6.67	4.07	
2-DPR002.46	7/8/1999	S	.30	25.77	6.49	2.62	
2-DPR002.46	8/10/1999	S	.30	26.63	6.91	1.42	
2-DPR002.46	9/15/1999	S	.30	21.57	6.42	6.26	.00
2-DPR002.46	10/25/1999	S	.30	9.73	6.52	8.79	.00
2-DPR002.46	11/22/1999	S	.30	13.24	6.54	5.98	
2-DPR002.46	12/27/1999	S	.30				
2-DPR002.46	2/15/2000	S	.30	5.60	6.53	10.82	
2-DPR002.46	3/14/2000	S	.30	8.83	6.68	9.74	.00
2-DPR002.46	4/11/2000	S	.30	14.69	6.32	8.18	.00
2-DPR002.46	5/18/2000	S	.30	19.90	6.58	5.17	.00
2-DPR002.46	6/13/2000	S	.30	24.60	6.52	4.36	.10
2-DPR002.46	7/12/2000	S	.30	23.04	6.96	5.28	.10
2-DPR002.46	8/1/2000	S	.30	24.17	6.59	5.81	.00
2-DPR002.46	9/7/2000	S	.30	18.60	6.91	6.34	.00
2-DPR002.46	10/5/2000	S	.30	20.14	6.98	6.06	.00
2-DPR002.46	11/8/2000	S	.30	12.80	6.54	7.87	.00
2-DPR002.46	12/20/2000	S	.30	2.10	6.69	10.74	.00
2-DPR002.46	1/10/2001	S	.30	1.33	6.50	11.30	.00
2-DPR002.46	2/21/2001	S	.30	10.08	6.43	9.71	.00
2-DPR002.46	3/19/2001	S	.30	7.31	6.59	9.56	.00
2-DPR002.46	4/18/2001	S	.30	9.48	6.80	8.89	.00
2-DPR002.46	4/3/2002	S	.30	16.96	6.71	7.42	.00
2-DPR002.46	5/22/2002	S	.30	14.19	6.63	8.94	.00
2-DPR002.46	6/17/2002	S	.30	21.85	6.62	4.20	.00

Station ID	Collection Date	Depth Desc	Depth	Temp Celcius	Field Ph	Do Probe	Salinity
2-DPR002.46	6/26/2002	S	.30	24.24	6.84	2.96	.00
2-DPR002.46	7/10/2002	S	.30	24.33	6.72	3.44	.00
2-DPR002.46	7/31/2002	S	.30	26.23	6.91	3.95	.00
2-DPR002.46	8/12/2002	S	.30	22.21	6.40	2.58	.12
2-DPR002.46	9/25/2002	S	.30	19.50	6.90	6.14	
2-DPR002.46	5/7/2003	S	.30	16.69	6.63	7.12	.00
2-DPR002.46	6/4/2003	S	.30	17.99	6.50	7.21	.00
2-DPR002.46	7/7/2003	S	.30	23.89	7.02	5.55	.00
2-DPR002.46	8/6/2003	S	.30	24.39	7.07	6.64	.00
2-DPR002.46	9/3/2003	S	.30	26.10	7.20	7.03	.00
2-DPR002.46	10/2/2003	S	.30	16.56	7.09	8.37	.00
2-DPR002.46	11/4/2003	S	.30	15.42	6.74	8.73	.00
2-DPR002.46	12/11/2003	S	.30	9.26	6.53	10.38	.00
2-DPR002.46	1/7/2004	S	.30	5.73	7.33	12.32	.00
2-DPR002.46	2/3/2004	S	.30	1.62	6.55	13.16	.00
2-DPR002.46	3/1/2004	S	.30	9.85	6.95	11.77	.00
90th Percentile				**24.5**	**7.0**		
10th Percentile				**5.7**	**6.4**		

Attachment D

Site Inspection

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road, Glen Allen, Virginia 23060-6295 **804/527-5020**

TO: **VA0091197 Permit File**
FROM: **Gina Ebbett Kelly**
DATE: **February 4, 2008**
SUBJECT: **Site Visit**
COPIES: **--**

On Wednesday, January 30, 2008, Ray Jenkins and I conducted a site visit at the Henrico County Water Treatment Plant (WTP) to aid in the VPDES permit reissuance process. Mr. Russ Navratil, the facility director, gave us a tour of the facility an addressed our questions.

Six overflow points are noted on the facility diagram which was provided with the permit application: raw water pumping station, plant underdrain system, backwash water tanks, filter overflow, finished water overflow, and finished water drains. With respect to the backwash waters, the first seven minutes of backwash water are directed to the sanitary sewer; secondary backwash water (the water used after the first seven minutes of backwash) is stored in the water reclamation tanks and is routed back into the head works of the plant. Overflow of the secondary backwash water into the detention basin is possible. Due to the capacity of the finished water clearwells, the potential for overflow into the detention pond from this source is minimal and most likely only possible is all pumping were to cease completely.

Various chemicals are stored onsite in the chemical building, including alum, calcium thiosulfate, oxygen, ammonia, polymers, potassium orthophosphate, sodium hydroxide, sodium hypochlorite, diesel fuel, and hydrofluosilic acid. Each chemical has its own spill containment structure. The floor drains in the chemical building drain to the sanitary sewer or are pumped manual to tanker trucks. Hazardous chemicals, such as ammonia, are stored in separate areas within the same building. Potassium permanganate is also used in the treatment process, but it is not stored onsite. This chemical is stored in totes at the river water intake.

The detention pond, outfall, and receiving stream were also observed, and the following twelve pictures were taken. At the time of the visit, the pond was receiving water from the underdrain system, and the pond was discharging. No adverse effects were observed in the immediate receiving stream (UT Deep Run Creek) or further downstream in Deep Run Creek.

Picture 1: View from the overflow and underdrain outlets, looking down towards the pond.

Picture 2: View facing the WTP; from the left: small pipe for underdrain system, ~24" pipe for clearwells, and 60" pipe for all overflows

Picture 3: View facing the WTP; sedimentation pond and cap covering the outfall structure; water mark depicts the elevation at which overflow and subsequent discharge occurs.

Picture 4: The outfall discharging.

Picture 5: Downstream of the outfall, UT Deep Run Creek.

Picture 6: Downstream of the outfall, UT Deep Run Creek.

Picture 7: Confluence of UT Deep Run Creek with Deep Run Creek

Picture 8: Deep Run Creek, upstream of the confluence

Picture 9: Deep Run Creek, downstream of the confluence

Picture 10: Deep Run Creek crossing Ridgefield Parkway; looking upstream

Picture 11: Deep Run Creek crossing Ridgefield Parkway; looking upstream

Picture 12: Deep Run Creek crossing Ridgefield Parkway; looking downstream

CDM

Memorandum

To: *Jack Hartigan, P.E.*

From: *Chris Waters* CJW

Date: *January 9, 2003*

Subject: *VPDES Permit No, VA 0091197—Henrico County WTP: Henrico WTP Chemical Storage & Containment*

In response to DEQ's December 20, 2002 e-mail request, the table below provides the material stored, tank size, means of containment, and release flow-path for chemical storage at the new Henrico County WTP:

Material Stored	Tank Volume	Means of Containment	Release Flow-Path
Aluminum Sulfate	75,000 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.
Aqua Ammonia	9,377 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.
Calcium Thiosulfate (Ozone Quenching)	4,700 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.
Coagulant and Filter Aid Polymers	6,400 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.
Hydrofluosilicic Acid	8,700 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.

Material Stored	Tank Volume	Means of Containment	Release Flow-Path
Liquid Oxygen	26,000 gallons	None	Liquid oxygen release would volatilize
Potassium Orthophosphate	9,700 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.
Sodium Hydroxide	47,200 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.
Sodium Hypochlorite	59,000 gallons	Wall	Chemical release would be isolated to the containment area. A portable pump would be used to remove the chemical to trucks for offsite disposal.
Diesel Fuel Oil	6,000 gallons	Double wall with leak detection system	The release flow-path is from the inner tank to the interstitial space between the inner and outer tanks. A fuel leak into the interstitial space would be detected by the leak detection alarm.

Attachment E

Effluent Limitation Development

MEMORANDUM

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

SUBJECT: Flow Frequency and 303(d) Status Determination
Henrico County Water Treatment Plant – VA0091197

TO: Gina R. E. Kelly

FROM: Jennifer V. Palmore, P.G.

DATE: October 31, 2007

COPIES: File

The Henrico County's water treatment facility discharges to an unnamed tributary of Deep Run near Glen Allen, VA. The discharge is located at rivermile 2-XVY000.16. Stream flow frequencies and the current 303(d) status have been requested at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The USGS Glen Allen Quadrangle shows the receiving stream to be an intermittent stream which drains to Deep Run. Due to its intermittent nature, the tributary is considered a Tier 1 water.
The flow frequencies for intermittent streams are listed below:

Unnamed Tributary to Deep Run at Outfall 001:

1Q30 = 0.00 cfs	High Flow 1Q10 = 0.0 cfs
1Q10 = 0.0 cfs	High Flow 7Q10 = 0.0 cfs
7Q10 = 0.0 cfs	High Flow 30Q10 = 0.0 cfs
30Q10 = 0.0 cfs	HM = 0.0 cfs
30Q5 = 0.0 cfs	Annual Average = 0.0 cfs

However, the intermittent tributary flows only 0.16 mile before it enters into Deep Run. Deep Run is shown as perennial and is located within a designated Public Water Supply segment; therefore it should be considered a Tier 2 water. The flow frequencies for Deep Run at the confluence with the receiving stream are needed for modeling purposes. From 2002 through 2003, the DEQ conducted 10 flow measurements on Tuckahoe Creek at Railroad Bridge, near Tuckahoe Village, VA (#02036687.75). The measurements were correlated with the same day daily mean values from the continuous record gage on Fine Creek at Fine Creek Mills, VA (#02036500). The measurements and daily mean values were plotted on a logarithmic graph and a best fit power trend line was plotted through the data points. Unfortunately, the R-value for the regression was unacceptable (R=0.57), so an outlying high flow event was excluded from the analysis. The R-value without this data point was strong (0.92). The flow frequencies from the reference gage were plugged into the equation for the regression line to calculate the associated flow frequencies at the measurement site on Tuckahoe Creek. Drainage area proportion was then used to calculate the flows at Deep Run at the confluence with the tributary. The data for the reference gage, measurement site, and confluence are presented below and the regression analysis is attached.

Fine Creek at Fine Creek Mills, VA (#02036500)

Drainage area - 22.1 mi^2

High flow months – December to May

Statistical period – 1944 to 2003

1Q30 = 0.09 cfs	High Flow 1Q10 = 2.5 cfs
1Q10 = 0.24 cfs	High Flow 7Q10 = 3.1 cfs
7Q10 = 0.30 cfs	High Flow 30Q10 = 5.8 cfs
30Q10 = 0.53 cfs	HM = 3.7 cfs
30Q5 = 0.98 cfs	

Tuckahoe Creek at Railroad Bridge, near Tuckahoe Village, VA (#02036687.75)

Drainage area – 64.3 mi^2

1Q30 = 0.015 cfs	High Flow 1Q10 = 3.7 cfs
1Q10 = 0.077 cfs	High Flow 7Q10 = 5.2 cfs
7Q10 = 0.11 cfs	High Flow 30Q10 = 15 cfs
30Q10 = 0.29 cfs	HM = 7.0 cfs
30Q5 = 0.79 cfs	

Deep Run at confluence with UT

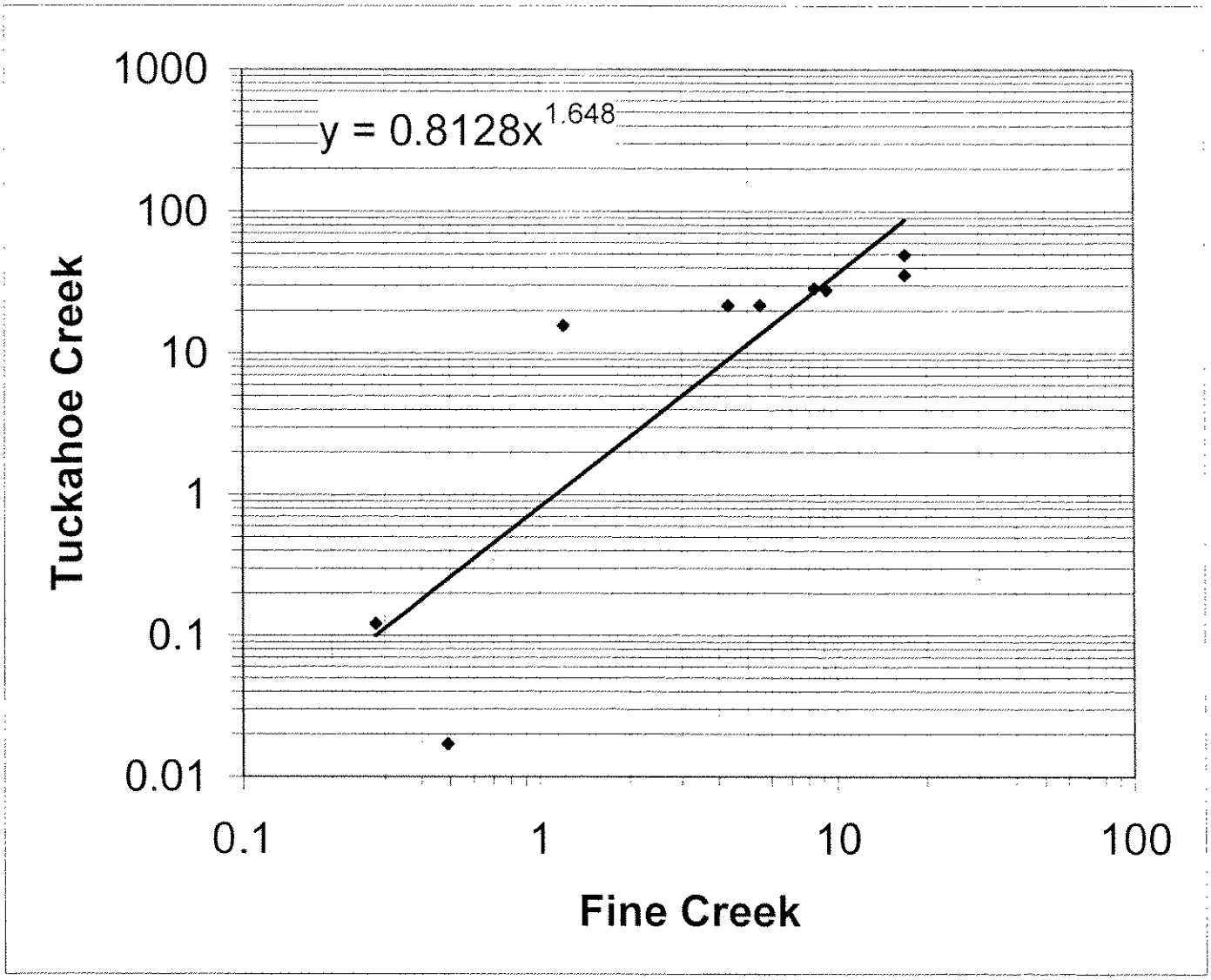
Drainage area – 3.39 mi^2

1Q30 = 0.00081 cfs (0.00052 MGD)	High Flow 1Q10 = 0.19 cfs (0.13 MGD)
1Q10 = 0.0041 cfs (0.0026 MGD)	High Flow 7Q10 = 0.28 cfs (0.18 MGD)
7Q10 = 0.0059 cfs (0.0038 MGD)	High Flow 30Q10 = 0.78 cfs (0.50 MGD)
30Q10 = 0.015 cfs (0.010 MGD)	HM = 0.37 cfs (0.24 MGD)
30Q5 = 0.041 cfs (0.027 MGD)	

The unnamed tributary was not assessed in the 2006 305(b)/303(d) Integrated Report. Although the tributary is not an impaired water, the entire watershed was addressed in the report "Bacteria TMDL for Tuckahoe Creek, Little Tuckahoe Creek, Anderson, Broad, Georges and Readers Branches, and Deep Run - Henrico, Goochland and Hanover Counties, Virginia". The water treatment plant received an annual E. coli allocation of $1.22*10^{12}$ E. coli cfu/year to address its occasional discharges.

If you have any questions concerning this analysis or need additional information, please let me know.

Tuckahoe Creek at Railroad Bridge, near Tuckahoe Village, VA #02036687.75
vs Fine Creek at Fine Creek Mills, VA #02036500



Flow Data (cfs)

Date	Tuckahoe	Fine
4/4/02	21.8	5.5
5/22/02	21.7	4.3
7/9/02	0.121	0.28
7/23/02	0.017	0.49
10/23/02	15.6	1.2
11/26/02	28.6	8.4
1/13/03	28	9.2
3/12/03	49.4	17
4/24/03	35.6	17
10/16/02	119	11

Omitted - Outlier (High Flow event)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.921872
R Square	0.849847
Adjusted R Square	0.828397
Standard Error	6.578324
Observations	9

Flow Frequencies (cfs)

Fine Creek		Tuckahoe	Deep Run
0.09	1Q30	0.015	0.00081
0.24	1Q10	0.077	0.0041
0.30	7Q10	0.11	0.0059
0.53	30Q10	0.29	0.015
0.98	30Q5	0.79	0.041
2.5	HF 1Q10	3.7	0.19
3.1	HF 7Q10	5.2	0.28
5.8	HF 30Q10	15	0.78
3.7	HM	7.0	0.37
22.1	DA (mi^2)	64.3	3.39

HF Months: Dec-May
Period: 1944-2003

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Henrico WTP Permit No.: VA0091197

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

Stream Information

Mean Hardness (as CaCO3) =	25	mg/L
90% Temperature (Annual) =	27	deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =	7.5	SU
10% Maximum pH =	7	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	y	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0	MGD
7Q10 (Annual) =	0	MGD
30Q10 (Annual) =	0	MGD
1Q10 (Wet season) =		MGD
30Q10 (Wet season) =		MGD
30Q5 =	0	MGD
Harmonic Mean =	0	MGD
Annual Average =		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) =	25	mg/L
90% Temp (Annual) =	27	deg C
90% Temp (Wet season) =		deg C
90% Maximum pH =	7.5	SU
10% Maximum pH =	7	SU
Discharge Flow =	0.7	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	--	--	1.2E+03	2.7E+03	--	--	1.2E+03	2.7E+03	--	--	--	--	--	--	--	--	--	--	1.2E+03	2.7E+03
Acrolein	0	--	--	3.2E+02	7.8E+02	--	--	3.2E+02	7.8E+02	--	--	--	--	--	--	--	--	--	--	3.2E+02	7.8E+02
Acrylonitrile[C]	0	--	--	5.9E-01	6.6E+00	--	--	5.9E-01	6.6E+00	--	--	--	--	--	--	--	--	--	--	5.9E-01	6.6E+00
Aldrin [C]	0	3.0E+00	--	1.3E-03	1.4E-03	3.0E+00	--	1.3E-03	1.4E-03	--	--	--	--	--	--	--	--	3.0E+00	--	1.3E-03	1.4E-03
Ammonia-N (mg/l) (Yearly)	0	1.99E+01	1.95E+00	--	--	2.0E+01	2.0E+00	--	--	--	--	--	--	--	--	--	--	2.0E+01	2.0E+00	--	--
Ammonia-N (mg/l) (High Flow)	0	1.99E+01	4.36E+00	--	--	2.0E+01	4.4E+00	--	--	--	--	--	--	--	--	--	--	2.0E+01	4.4E+00	--	--
Anthracene	0	--	--	9.6E+03	1.1E+05	--	--	9.6E+03	1.1E+05	--	--	--	--	--	--	--	--	--	--	9.6E+03	1.1E+05
Antimony	0	--	--	1.4E+01	4.3E+03	--	--	1.4E+01	4.3E+03	--	--	--	--	--	--	--	--	--	--	1.4E+01	4.3E+03
Arsenic	0	3.4E+02	1.5E+02	1.0E+01	--	3.4E+02	1.5E+02	1.0E+01	--	--	--	--	--	--	--	--	--	3.4E+02	1.5E+02	1.0E+01	--
Barium	0	--	--	2.0E+03	--	--	--	2.0E+03	--	--	--	--	--	--	--	--	--	--	--	2.0E+03	--
Benzene [C]	0	--	--	1.2E+01	7.1E+02	--	--	1.2E+01	7.1E+02	--	--	--	--	--	--	--	--	--	--	1.2E+01	7.1E+02
Benzidine[C]	0	--	--	1.2E-03	5.4E-03	--	--	1.2E-03	5.4E-03	--	--	--	--	--	--	--	--	--	--	1.2E-03	5.4E-03
Benzo (a) anthracene [C]	0	--	--	4.4E-02	4.9E-01	--	--	4.4E-02	4.9E-01	--	--	--	--	--	--	--	--	--	--	4.4E-02	4.9E-01
Benzo (b) fluoranthene [C]	0	--	--	4.4E-02	4.9E-01	--	--	4.4E-02	4.9E-01	--	--	--	--	--	--	--	--	--	--	4.4E-02	4.9E-01
Benzo (k) fluoranthene [C]	0	--	--	4.4E-02	4.9E-01	--	--	4.4E-02	4.9E-01	--	--	--	--	--	--	--	--	--	--	4.4E-02	4.9E-01
Benzo (a) pyrene [C]	0	--	--	4.4E-02	4.9E-01	--	--	4.4E-02	4.9E-01	--	--	--	--	--	--	--	--	--	--	4.4E-02	4.9E-01
Bis2-Chloroethyl Ether	0	--	--	3.1E-01	1.4E+01	--	--	3.1E-01	1.4E+01	--	--	--	--	--	--	--	--	--	--	3.1E-01	1.4E+01
Bis2-Chloroisopropyl Ether	0	--	--	1.4E+03	1.7E+05	--	--	1.4E+03	1.7E+05	--	--	--	--	--	--	--	--	--	--	1.4E+03	1.7E+05
Bromoform [C]	0	--	--	4.4E+01	3.6E+03	--	--	4.4E+01	3.6E+03	--	--	--	--	--	--	--	--	--	--	4.4E+01	3.6E+03
Butylbenzylphthalate	0	--	--	3.0E+03	5.2E+03	--	--	3.0E+03	5.2E+03	--	--	--	--	--	--	--	--	--	--	3.0E+03	5.2E+03
Cadmium	0	8.2E-01	3.8E-01	5.0E+00	--	8.2E-01	3.8E-01	5.0E+00	--	--	--	--	--	--	--	--	--	8.2E-01	3.8E-01	5.0E+00	--
Carbon Tetrachloride [C]	0	--	--	2.5E+00	4.4E+01	--	--	2.5E+00	4.4E+01	--	--	--	--	--	--	--	--	--	--	2.5E+00	4.4E+01
Chlordane [C]	0	2.4E+00	4.3E-03	2.1E-02	2.2E-02	2.4E+00	4.3E-03	2.1E-02	2.2E-02	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	2.1E-02	2.2E-02
Chloride	0	8.6E+05	2.3E+05	2.5E+05	--	8.6E+05	2.3E+05	2.5E+05	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	2.5E+05	--
TRC	0	1.9E+01	1.1E+01	--	--	1.9E+01	1.1E+01	--	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	--	--
Chlorobenzene	0	--	--	6.8E+02	2.1E+04	--	--	6.8E+02	2.1E+04	--	--	--	--	--	--	--	--	--	--	6.8E+02	2.1E+04

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	--	--	4.1E+00	3.4E+02	--	--	4.1E+00	3.4E+02	--	--	--	--	--	--	--	--	--	--	4.1E+00	3.4E+02
Chloroform [C]	0	--	--	3.5E+02	2.9E+04	--	--	3.5E+02	2.9E+04	--	--	--	--	--	--	--	--	--	--	3.5E+02	2.9E+04
2-Chloronaphthalene	0	--	--	1.7E+03	4.3E+03	--	--	1.7E+03	4.3E+03	--	--	--	--	--	--	--	--	--	--	1.7E+03	4.3E+03
2-Chlorophenol	0	--	--	1.2E+02	4.0E+02	--	--	1.2E+02	4.0E+02	--	--	--	--	--	--	--	--	--	--	1.2E+02	4.0E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	--	--	8.3E-02	4.1E-02	--	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	--	--
Chromium III	0	1.8E+02	2.4E+01	--	--	1.8E+02	2.4E+01	--	--	--	--	--	--	--	--	--	--	1.8E+02	2.4E+01	--	--
Chromium VI	0	1.6E+01	1.1E+01	--	--	1.6E+01	1.1E+01	--	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	--	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	1.0E+02	--	--	--	--	--	--	--	--	--	--	--	1.0E+02	--
Chrysene [C]	0	--	--	4.4E-02	4.9E-01	--	--	4.4E-02	4.9E-01	--	--	--	--	--	--	--	--	--	--	4.4E-02	4.9E-01
Copper	0	3.6E+00	2.7E+00	1.3E+03	--	3.6E+00	2.7E+00	1.3E+03	--	--	--	--	--	--	--	--	--	3.6E+00	2.7E+00	1.3E+03	--
Cyanide	0	2.2E+01	5.2E+00	7.0E+02	2.2E+05	2.2E+01	5.2E+00	7.0E+02	2.2E+05	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	7.0E+02	2.2E+05
DDD [C]	0	--	--	8.3E-03	8.4E-03	--	--	8.3E-03	8.4E-03	--	--	--	--	--	--	--	--	--	--	8.3E-03	8.4E-03
DDE [C]	0	--	--	5.9E-03	5.9E-03	--	--	5.9E-03	5.9E-03	--	--	--	--	--	--	--	--	--	--	5.9E-03	5.9E-03
DDT [C]	0	1.1E+00	1.0E-03	5.9E-03	5.9E-03	1.1E+00	1.0E-03	5.9E-03	5.9E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	5.9E-03	5.9E-03
Demeton	0	--	1.0E-01	--	--	--	1.0E-01	--	--	--	--	--	--	--	--	--	--	--	1.0E-01	--	--
Dibenz(a,h)anthracene [C]	0	--	--	4.4E-02	4.9E-01	--	--	4.4E-02	4.9E-01	--	--	--	--	--	--	--	--	--	--	4.4E-02	4.9E-01
Dibutyl phthatate	0	--	--	2.7E+03	1.2E+04	--	--	2.7E+03	1.2E+04	--	--	--	--	--	--	--	--	--	--	2.7E+03	1.2E+04
Dichloromethane (Methylene Chloride) [C]	0	--	--	4.7E+01	1.6E+04	--	--	4.7E+01	1.6E+04	--	--	--	--	--	--	--	--	--	--	4.7E+01	1.6E+04
1,2-Dichlorobenzene	0	--	--	2.7E+03	1.7E+04	--	--	2.7E+03	1.7E+04	--	--	--	--	--	--	--	--	--	--	2.7E+03	1.7E+04
1,3-Dichlorobenzene	0	--	--	4.0E+02	2.6E+03	--	--	4.0E+02	2.6E+03	--	--	--	--	--	--	--	--	--	--	4.0E+02	2.6E+03
1,4-Dichlorobenzene	0	--	--	4.0E+02	2.6E+03	--	--	4.0E+02	2.6E+03	--	--	--	--	--	--	--	--	--	--	4.0E+02	2.6E+03
3,3-Dichlorobenzidine[C]	0	--	--	4.0E-01	7.7E-01	--	--	4.0E-01	7.7E-01	--	--	--	--	--	--	--	--	--	--	4.0E-01	7.7E-01
Dichlorobromomethane [C]	0	--	--	5.6E+00	4.6E+02	--	--	5.6E+00	4.6E+02	--	--	--	--	--	--	--	--	--	--	5.6E+00	4.6E+02
1,2-Dichloroethane [C]	0	--	--	3.8E+00	9.9E+02	--	--	3.8E+00	9.9E+02	--	--	--	--	--	--	--	--	--	--	3.8E+00	9.9E+02
1,1-Dichloroethylene	0	--	--	3.1E+02	1.7E+04	--	--	3.1E+02	1.7E+04	--	--	--	--	--	--	--	--	--	--	3.1E+02	1.7E+04
1,2-trans-dichloroethylene	0	--	--	7.0E+02	1.4E+05	--	--	7.0E+02	1.4E+05	--	--	--	--	--	--	--	--	--	--	7.0E+02	1.4E+05
2,4-Dichlorophenol	0	--	--	9.3E+01	7.9E+02	--	--	9.3E+01	7.9E+02	--	--	--	--	--	--	--	--	--	--	9.3E+01	7.9E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	1.0E+02	--	--	--	1.0E+02	--	--	--	--	--	--	--	--	--	--	--	1.0E+02	--
1,2-Dichloropropane[C]	0	--	--	5.2E+00	3.9E+02	--	--	5.2E+00	3.9E+02	--	--	--	--	--	--	--	--	--	--	5.2E+00	3.9E+02
1,3-Dichloropropene	0	--	--	1.0E+01	1.7E+03	--	--	1.0E+01	1.7E+03	--	--	--	--	--	--	--	--	--	--	1.0E+01	1.7E+03
Dieldrin [C]	0	2.4E-01	5.6E-02	1.4E-03	1.4E-03	2.4E-01	5.6E-02	1.4E-03	1.4E-03	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	1.4E-03	1.4E-03
Diethyl Phthalate	0	--	--	2.3E+04	1.2E+05	--	--	2.3E+04	1.2E+05	--	--	--	--	--	--	--	--	--	--	2.3E+04	1.2E+05
Di-2-Ethylhexyl Phthatate [C]	0	--	--	1.8E+01	5.9E+01	--	--	1.8E+01	5.9E+01	--	--	--	--	--	--	--	--	--	--	1.8E+01	5.9E+01
2,4-Dimethylphenol	0	--	--	5.4E+02	2.3E+03	--	--	5.4E+02	2.3E+03	--	--	--	--	--	--	--	--	--	--	5.4E+02	2.3E+03
Dimethyl Phthalate	0	--	--	3.1E+05	2.9E+06	--	--	3.1E+05	2.9E+06	--	--	--	--	--	--	--	--	--	--	3.1E+05	2.9E+06
Di-n-Butyl Phthalate	0	--	--	2.7E+03	1.2E+04	--	--	2.7E+03	1.2E+04	--	--	--	--	--	--	--	--	--	--	2.7E+03	1.2E+04
2,4 Dinitrophenol	0	--	--	7.0E+01	1.4E+04	--	--	7.0E+01	1.4E+04	--	--	--	--	--	--	--	--	--	--	7.0E+01	1.4E+04
2-Methyl-4,6-Dinitrophenol	0	--	--	1.3E+01	7.65E+02	--	--	1.3E+01	7.7E+02	--	--	--	--	--	--	--	--	--	--	1.3E+01	7.7E+02
2,4-Dinitrotoluene [C]	0	--	--	1.1E+00	9.1E+01	--	--	1.1E+00	9.1E+01	--	--	--	--	--	--	--	--	--	--	1.1E+00	9.1E+01
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	1.2E-06	1.2E-06	--	--	1.2E-06	1.2E-06	--	--	--	--	--	--	--	--	--	--	1.2E-06	1.2E-06
1,2-Diphenylhydrazine[C]	0	--	--	4.0E-01	5.4E+00	--	--	4.0E-01	5.4E+00	--	--	--	--	--	--	--	--	--	--	4.0E-01	5.4E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	1.1E+02	2.4E+02	2.2E-01	5.6E-02	1.1E+02	2.4E+02	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	1.1E+02	2.4E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	1.1E+02	2.4E+02	2.2E-01	5.6E-02	1.1E+02	2.4E+02	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	1.1E+02	2.4E+02
Endosulfan Sulfate	0	--	--	1.1E+02	2.4E+02	--	--	1.1E+02	2.4E+02	--	--	--	--	--	--	--	--	--	--	1.1E+02	2.4E+02
Endrin	0	8.6E-02	3.6E-02	7.6E-01	8.1E-01	8.6E-02	3.6E-02	7.6E-01	8.1E-01	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	7.8E-01	8.1E-01
Endrin Aldehyde	0	--	--	7.6E-01	8.1E-01	--	--	7.6E-01	8.1E-01	--	--	--	--	--	--	--	--	--	--	7.6E-01	8.1E-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	--	--	3.1E+03	2.9E+04	--	--	3.1E+03	2.9E+04	--	--	--	--	--	--	--	--	--	--	3.1E+03	2.9E+04
Fluoranthene	0	--	--	3.0E+02	3.7E+02	--	--	3.0E+02	3.7E+02	--	--	--	--	--	--	--	--	--	--	3.0E+02	3.7E+02
Fluorene	0	--	--	1.3E+03	1.4E+04	--	--	1.3E+03	1.4E+04	--	--	--	--	--	--	--	--	--	--	1.3E+03	1.4E+04
Foaming Agents	0	--	--	5.0E+02	--	--	--	5.0E+02	--	--	--	--	--	--	--	--	--	--	--	5.0E+02	--
Guthion	0	--	1.0E-02	--	--	--	1.0E-02	--	--	--	--	--	--	--	--	--	--	--	1.0E-02	--	--
Heptachlor [C]	0	5.2E-01	3.8E-03	2.1E-03	2.1E-03	5.2E-01	3.8E-03	2.1E-03	2.1E-03	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	2.1E-03	2.1E-03
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	1.0E-03	1.1E-03	5.2E-01	3.8E-03	1.0E-03	1.1E-03	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	1.0E-03	1.1E-03
Hexachlorobenzene[C]	0	--	--	7.5E-03	7.7E-03	--	--	7.5E-03	7.7E-03	--	--	--	--	--	--	--	--	--	--	7.5E-03	7.7E-03
Hexachlorobutadiene[C]	0	--	--	4.4E+00	5.0E+02	--	--	4.4E+00	5.0E+02	--	--	--	--	--	--	--	--	--	--	4.4E+00	5.0E+02
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	3.9E-02	1.3E-01	--	--	3.9E-02	1.3E-01	--	--	--	--	--	--	--	--	--	--	3.9E-02	1.3E-01
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	1.4E-01	4.6E-01	--	--	1.4E-01	4.6E-01	--	--	--	--	--	--	--	--	--	--	1.4E-01	4.6E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	--	1.9E-01	6.3E-01	9.5E-01	--	1.9E-01	6.3E-01	--	--	--	--	--	--	--	--	9.5E-01	--	1.9E-01	6.3E-01
Hexachlorocyclopentadiene	0	--	--	2.4E+02	1.7E+04	--	--	2.4E+02	1.7E+04	--	--	--	--	--	--	--	--	--	--	2.4E+02	1.7E+04
Hexachloroethane[C]	0	--	--	1.9E+01	8.9E+01	--	--	1.9E+01	8.9E+01	--	--	--	--	--	--	--	--	--	--	1.9E+01	8.9E+01
Hydrogen Sulfide	0	--	2.0E+00	--	--	--	2.0E+00	--	--	--	--	--	--	--	--	--	--	--	2.0E+00	--	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	4.4E-02	4.9E-01	--	--	4.4E-02	4.9E-01	--	--	--	--	--	--	--	--	--	--	4.4E-02	4.9E-01
Iron	0	--	--	3.0E+02	--	--	--	3.0E+02	--	--	--	--	--	--	--	--	--	--	--	3.0E+02	--
Isophorone[C]	0	--	--	3.6E+02	2.6E+04	--	--	3.6E+02	2.6E+04	--	--	--	--	--	--	--	--	--	--	3.6E+02	2.6E+04
Kepone	0	--	0.0E+00	--	--	--	0.0E+00	--	--	--	--	--	--	--	--	--	--	--	0.0E+00	--	--
Lead	0	2.0E+01	2.3E+00	1.5E+01	--	2.0E+01	2.3E+00	1.5E+01	--	--	--	--	--	--	--	--	--	2.0E+01	2.3E+00	1.5E+01	--
Malathion	0	--	1.0E-01	--	--	--	1.0E-01	--	--	--	--	--	--	--	--	--	--	--	1.0E-01	--	--
Manganese	0	--	--	5.0E+01	--	--	--	5.0E+01	--	--	--	--	--	--	--	--	--	--	--	5.0E+01	--
Mercury	0	1.4E+00	7.7E-01	5.0E-02	5.1E-02	1.4E+00	7.7E-01	5.0E-02	5.1E-02	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	5.0E-02	5.1E-02
Methyl Bromide	0	--	--	4.8E+01	4.0E+03	--	--	4.8E+01	4.0E+03	--	--	--	--	--	--	--	--	--	--	4.8E+01	4.0E+03
Methoxychlor	0	--	3.0E-02	1.0E+02	--	--	3.0E-02	1.0E+02	--	--	--	--	--	--	--	--	--	--	3.0E-02	1.0E+02	--
Mirex	0	--	0.0E+00	--	--	--	0.0E+00	--	--	--	--	--	--	--	--	--	--	--	0.0E+00	--	--
Monochlorobenzene	0	--	--	6.8E+02	2.1E+04	--	--	6.8E+02	2.1E+04	--	--	--	--	--	--	--	--	--	--	6.8E+02	2.1E+04
Nickel	0	5.6E+01	6.3E+00	8.1E+02	4.6E+03	5.6E+01	6.3E+00	6.1E+02	4.6E+03	--	--	--	--	--	--	--	--	5.6E+01	6.3E+00	6.1E+02	4.6E+03
Nitrate (as N)	0	--	--	1.0E+04	--	--	--	1.0E+04	--	--	--	--	--	--	--	--	--	--	--	1.0E+04	--
Nitrobenzene	0	--	--	1.7E+01	1.9E+03	--	--	1.7E+01	1.9E+03	--	--	--	--	--	--	--	--	--	--	1.7E+01	1.9E+03
N-Nitrosodimethylamine[C]	0	--	--	6.9E-03	8.1E+01	--	--	6.9E-03	8.1E+01	--	--	--	--	--	--	--	--	--	--	6.9E-03	8.1E+01
N-Nitrosodiphenylamine[C]	0	--	--	5.0E+01	1.6E+02	--	--	5.0E+01	1.6E+02	--	--	--	--	--	--	--	--	--	--	5.0E+01	1.6E+02
N-Nitrosodi-n-propylamine[C]	0	--	--	5.0E-02	1.4E+01	--	--	5.0E-02	1.4E+01	--	--	--	--	--	--	--	--	--	--	5.0E-02	1.4E+01
Parathion	0	6.5E-02	1.3E-02	--	--	6.5E-02	1.3E-02	--	--	--	--	--	--	--	--	--	--	6.6E-02	1.3E-02	--	--
PCB-1016	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	--	--	--	--	--	--	--	--	1.4E-02	--	--
PCB-1221	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	--	--	--	--	--	--	--	--	1.4E-02	--	--
PCB-1232	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	--	--	--	--	--	--	--	--	1.4E-02	--	--
PCB-1242	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	--	--	--	--	--	--	--	--	1.4E-02	--	--
PCB-1248	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	--	--	--	--	--	--	--	--	1.4E-02	--	--
PCB-1254	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	--	--	--	--	--	--	--	--	1.4E-02	--	--
PCB-1260	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	--	--	--	--	--	--	--	--	1.4E-02	--	--
PCB Total[C]	0	--	--	1.7E-03	1.7E-03	--	--	1.7E-03	1.7E-03	--	--	--	--	--	--	--	--	--	--	1.7E-03	1.7E-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
Pentachlorophenol [C]	0	8.7E+00	6.7E+00	2.8E+00	8.2E+01	8.7E+00	6.7E+00	2.8E+00	8.2E+01	--	--	--	--	--	--	--	--	8.7E+00	6.7E+00	2.8E+00	8.2E+01
Phenol	0	--	--	2.1E+04	4.6E+06	--	--	2.1E+04	4.6E+06	--	--	--	--	--	--	--	--	--	--	2.1E+04	4.6E+06
Pyrene	0	--	--	9.6E+02	1.1E+04	--	--	9.6E+02	1.1E+04	--	--	--	--	--	--	--	--	--	--	9.6E+02	1.1E+04
Radionuclides (pCi/l except Beta/Photon)	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gross Alpha Activity	0	--	--	1.5E+01	1.5E+01	--	--	1.5E+01	1.5E+01	--	--	--	--	--	--	--	--	--	--	1.5E+01	1.5E+01
Beta and Photon Activity (mrem/yr)	0	--	--	4.0E+00	4.0E+00	--	--	4.0E+00	4.0E+00	--	--	--	--	--	--	--	--	--	--	4.0E+00	4.0E+00
Strontium-90	0	--	--	8.0E+00	8.0E+00	--	--	8.0E+00	8.0E+00	--	--	--	--	--	--	--	--	--	--	8.0E+00	8.0E+00
Tritium	0	--	--	2.0E+04	2.0E+04	--	--	2.0E+04	2.0E+04	--	--	--	--	--	--	--	--	--	--	2.0E+04	2.0E+04
Selenium	0	2.0E+01	5.0E+00	1.7E+02	1.1E+04	2.0E+01	5.0E+00	1.7E+02	1.1E+04	--	--	--	--	--	--	--	--	2.0E+01	5.0E+00	1.7E+02	1.1E+04
Silver	0	3.2E-01	--	--	--	3.2E-01	--	--	--	--	--	--	--	--	--	--	--	3.2E-01	--	--	--
Sulfate	0	--	--	2.5E+05	--	--	--	2.5E+05	--	--	--	--	--	--	--	--	--	--	--	2.5E+05	--
1,1,2,2-Tetrachloroethane [C]	0	--	--	1.7E+00	1.1E+02	--	--	1.7E+00	1.1E+02	--	--	--	--	--	--	--	--	--	--	1.7E+00	1.1E+02
Tetrachloroethylene [C]	0	--	--	8.0E+00	8.9E+01	--	--	8.0E+00	8.9E+01	--	--	--	--	--	--	--	--	--	--	8.0E+00	8.9E+01
Thallium	0	--	--	1.7E+00	6.3E+00	--	--	1.7E+00	6.3E+00	--	--	--	--	--	--	--	--	--	--	1.7E+00	6.3E+00
Toluene	0	--	--	6.8E+03	2.0E+05	--	--	6.8E+03	2.0E+05	--	--	--	--	--	--	--	--	--	--	6.8E+03	2.0E+05
Total dissolved solids	0	--	--	5.0E+05	--	--	--	5.0E+05	--	--	--	--	--	--	--	--	--	--	--	5.0E+05	--
Toxaphene [C]	0	7.3E-01	2.0E-04	7.3E-03	7.5E-03	7.3E-01	2.0E-04	7.3E-03	7.5E-03	--	--	--	--	--	--	--	--	7.3E-01	2.0E-04	7.3E-03	7.5E-03
Tributyltin	0	4.6E-01	6.3E-02	--	--	4.6E-01	6.3E-02	--	--	--	--	--	--	--	--	--	--	4.6E-01	6.3E-02	--	--
1,2,4-Trichlorobenzene	0	--	--	2.6E+02	9.4E+02	--	--	2.6E+02	9.4E+02	--	--	--	--	--	--	--	--	--	--	2.6E+02	9.4E+02
1,1,2-Trichloroethane [C]	0	--	--	6.0E+00	4.2E+02	--	--	6.0E+00	4.2E+02	--	--	--	--	--	--	--	--	--	--	6.0E+00	4.2E+02
Trichloroethylene [C]	0	--	--	2.7E+01	8.1E+02	--	--	2.7E+01	8.1E+02	--	--	--	--	--	--	--	--	--	--	2.7E+01	8.1E+02
2,4,6-Trichlorophenol [C]	0	--	--	2.1E+01	6.5E+01	--	--	2.1E+01	6.5E+01	--	--	--	--	--	--	--	--	--	--	2.1E+01	6.5E+01
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	5.0E+01	--	--	--	5.0E+01	--	--	--	--	--	--	--	--	--	--	--	5.0E+01	--
Vinyl Chloride [C]	0	--	--	2.3E-01	6.1E+01	--	--	2.3E-01	6.1E+01	--	--	--	--	--	--	--	--	--	--	2.3E-01	6.1E+01
Zinc	0	3.6E+01	3.6E+01	9.1E+03	6.9E+04	3.6E+01	3.6E+01	9.1E+03	6.9E+04	--	--	--	--	--	--	--	--	3.6E+01	3.6E+01	9.1E+03	6.9E+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, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	1.4E+01
Arsenic	1.0E+01
Barium	2.0E+03
Cadmium	2.3E-01
Chromium III	1.4E+01
Chromium VI	6.4E+00
Copper	1.5E+00
Iron	3.0E+02
Lead	1.4E+00
Manganese	5.0E+01
Mercury	5.0E-02
Nickel	3.8E+00
Selenium	3.0E+00
Silver	1.3E-01
Zinc	1.4E+01

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

Mixing Zone Predictions for Henrico Co WTP

Effluent Flow = 0.7 MGD
Stream 7Q10 = 0.0038 MGD
Stream 30Q10 = 0.01 MGD
Stream 1Q10 = 0.0026 MGD
Stream slope = 0.00038 ft/ft
Stream width = 10 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .6158 ft
Length = 132.36 ft
Velocity = .1769 ft/sec
Residence Time = .0087 days

Recommendation:

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

Mixing Zone Predictions @ 30Q10

Depth = .6193 ft
Length = 131.69 ft
Velocity = .1775 ft/sec
Residence Time = .0086 days

Recommendation:

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

Mixing Zone Predictions @ 1Q10

Depth = .6152 ft
Length = 132.48 ft
Velocity = .1768 ft/sec
Residence Time = .2082 hours

Recommendation:

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

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Henrico WTP Permit No.: VA0091197

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

Stream Information

Mean Hardness (as CaCO3) =	49.8	mg/L
90% Temperature (Annual) =	24.5	deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =	7	SU
10% Maximum pH =	6.4	SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	y	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0.0026	MGD
7Q10 (Annual) =	0.0038	MGD
30Q10 (Annual) =	0.01	MGD
1Q10 (Wet season) =		MGD
30Q10 (Wet season) =		MGD
30Q5 =	0.027	MGD
Harmonic Mean =	0.24	MGD
Annual Average =		MGD

Mixing Information

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

Effluent Information

Mean Hardness (as CaCO3) =	25	mg/L
90% Temp (Annual) =	27	deg C
90% Temp (Wet season) =		deg C
90% Maximum pH =	7.5	SU
10% Maximum pH =	7	SU
Discharge Flow =	0.7	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	--	--	1.2E+03	2.7E+03	--	--	1.2E+03	2.8E+03	--	--	1.2E+02	2.7E+02	--	--	1.2E+02	2.8E+02	**--**	**--**	**1.2E+02**	**2.8E+02**
Acrolein	0	--	--	3.2E+02	7.8E+02	--	--	3.3E+02	8.1E+02	--	--	3.2E+01	7.8E+01	--	--	3.3E+01	8.1E+01	**--**	**--**	**3.3E+01**	**8.1E+01**
Acrylonitrile[C]	0	--	--	5.9E-01	6.6E+00	--	--	7.9E-01	8.9E+00	--	--	5.9E-02	6.6E-01	--	--	7.9E-02	8.9E-01	**--**	**--**	**7.9E-02**	**8.9E-01**
Aldrin [C]	0	3.0E+00	--	1.3E-03	1.4E-03	3.0E+00	--	1.7E-03	1.9E-03	7.5E-01	--	1.3E-04	1.4E-04	7.5E-01	--	1.7E-04	1.9E-04	**7.5E-01**	**--**	**1.7E-04**	**1.9E-04**
Ammonia-N (mg/l) (Yearly)	0	2.00E+01	1.98E+00	--	--	2.0E+01	2.0E+00	--	--	5.00E+00	4.95E-01	--	--	5.0E+00	5.0E-01	--	--	**5.0E+00**	**5.0E-01**	**--**	**--**
Ammonia-N (mg/l) (High Flow)	0	1.99E+01	4.36E+00	--	--	2.0E+01	4.4E+00	--	--	4.97E+00	1.09E+00	--	--	5.0E+00	1.1E+00	--	--	**5.0E+00**	**1.1E+00**	**--**	**--**
Anthracene	0	--	--	9.6E+03	1.1E+05	--	--	1.0E+04	1.1E+05	--	--	9.6E+02	1.1E+04	--	--	1.0E+03	1.1E+04	**--**	**--**	**1.0E+03**	**1.1E+04**
Antimony	0	--	--	1.4E+01	4.3E+03	--	--	1.5E+01	4.5E+03	--	--	1.4E+00	4.3E+02	--	--	1.5E+00	4.5E+02	**--**	**--**	**1.5E+00**	**4.5E+02**
Arsenic	0	3.4E+02	1.5E+02	1.0E+01	--	3.4E+02	1.5E+02	1.0E+01	--	8.5E+01	3.8E+01	1.0E+00	--	8.5E+01	3.8E+01	1.0E+00	--	**8.5E+01**	**3.8E+01**	**1.0E+00**	**--**
Barium	0	--	--	2.0E+03	--	--	--	2.1E+03	--	--	--	2.0E+02	--	--	--	2.1E+02	--	**--**	**--**	**2.1E+02**	**--**
Benzene [C]	0	--	--	1.2E+01	7.1E+02	--	--	1.6E+01	9.5E+02	--	--	1.2E+00	7.1E+01	--	--	1.6E+00	9.5E+01	**--**	**--**	**1.6E+00**	**9.5E+01**
Benzidine[C]	0	--	--	1.2E-03	5.4E-03	--	--	1.6E-03	7.3E-03	--	--	1.2E-04	5.4E-04	--	--	1.6E-04	7.3E-04	**--**	**--**	**1.6E-04**	**7.3E-04**
Benzo (a) anthracene [C]	0	--	--	4.4E-02	4.9E-01	--	--	5.9E-02	6.6E-01	--	--	4.4E-03	4.9E-02	--	--	5.9E-03	6.6E-02	**--**	**--**	**5.9E-03**	**6.6E-02**
Benzo (b) fluoranthene [C]	0	--	--	4.4E-02	4.9E-01	--	--	5.9E-02	6.6E-01	--	--	4.4E-03	4.9E-02	--	--	5.9E-03	6.6E-02	**--**	**--**	**5.9E-03**	**6.6E-02**
Benzo (k) fluoranthene [C]	0	--	--	4.4E-02	4.9E-01	--	--	5.9E-02	6.6E-01	--	--	4.4E-03	4.9E-02	--	--	5.9E-03	6.6E-02	**--**	**--**	**5.9E-03**	**6.6E-02**
Benzo (a) pyrene [C]	0	--	--	4.4E-02	4.9E-01	--	--	5.9E-02	6.6E-01	--	--	4.4E-03	4.9E-02	--	--	5.9E-03	6.6E-02	**--**	**--**	**5.9E-03**	**6.6E-02**
Bis2-Chloroethyl Ether	0	--	--	3.1E-01	1.4E+01	--	--	3.2E-01	1.5E+01	--	--	3.1E-02	1.4E+00	--	--	3.2E-02	1.5E+00	**--**	**--**	**3.2E-02**	**1.5E+00**
Bis2-Chloroisopropyl Ether	0	--	--	1.4E+03	1.7E+05	--	--	1.5E+03	1.8E+05	--	--	1.4E+02	1.7E+04	--	--	1.5E+02	1.8E+04	**--**	**--**	**1.5E+02**	**1.8E+04**
Bromoform [C]	0	--	--	4.4E+01	3.6E+03	--	--	5.9E+01	4.8E+03	--	--	4.4E+00	3.6E+02	--	--	5.9E+00	4.8E+02	**--**	**--**	**5.9E+00**	**4.8E+02**
Butylbenzylphthalate	0	--	--	3.0E+03	5.2E+03	--	--	3.1E+03	5.4E+03	--	--	3.0E+02	5.2E+02	--	--	3.1E+02	5.4E+02	**--**	**--**	**3.1E+02**	**5.4E+02**
Cadmium	0	8.2E-01	3.8E-01	5.0E+00	--	8.3E-01	3.9E-01	5.2E+00	--	2.1E-01	9.6E-02	5.0E-01	--	2.1E-01	9.6E-02	5.2E-01	--	**2.1E-01**	**9.6E-02**	**5.2E-01**	**--**
Carbon Tetrachloride [C]	0	--	--	2.5E+00	4.4E+01	--	--	3.4E+00	5.9E+01	--	--	2.5E-01	4.4E+00	--	--	3.4E-01	5.9E+00	**--**	**--**	**3.4E-01**	**5.9E+00**
Chlordane [C]	0	2.4E+00	4.3E-03	2.1E-02	2.2E-02	2.4E+00	4.3E-03	2.8E-02	3.0E-02	6.0E-01	1.1E-03	2.1E-03	2.2E-03	6.0E-01	1.1E-03	2.8E-03	3.0E-03	**6.0E-01**	**1.1E-03**	**2.8E-03**	**3.0E-03**
Chloride	0	8.6E+05	2.3E+05	2.5E+05	--	8.6E+05	2.3E+05	2.6E+05	--	2.2E+05	5.8E+04	2.5E+04	--	2.2E+05	5.8E+04	2.6E+04	--	**2.2E+05**	**5.8E+04**	**2.6E+04**	**--**
TRC	0	1.9E+01	1.1E+01	--	--	1.9E+01	1.1E+01	--	--	4.8E+00	2.6E+00	--	--	4.8E+00	2.8E+00	--	--	**4.8E+00**	**2.8E+00**	**--**	**--**
Chlorobenzene	0	--	--	6.8E+02	2.1E+04	--	--	7.1E+02	2.2E+04	--	--	6.8E+01	2.1E+03	--	--	7.1E+01	2.2E+03	**--**	**--**	**7.1E+01**	**2.2E+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	--	--	4.1E+00	3.4E+02	--	--	5.5E+00	4.6E+02	--	--	4.1E-01	3.4E+01	--	--	5.5E-01	4.6E+01	--	--	5.5E-01	4.6E+01
Chloroform [C]	0	--	--	3.5E+02	2.9E+04	--	--	4.7E+02	3.9E+04	--	--	3.5E+01	2.9E+03	--	--	4.7E+01	3.9E+03	--	--	4.7E+01	3.9E+03
2-Chloronaphthalene	0	--	--	1.7E+03	4.3E+03	--	--	1.8E+03	4.5E+03	--	--	1.7E+02	4.3E+02	--	--	1.8E+02	4.5E+02	--	--	1.8E+02	4.5E+02
2-Chlorophenol	0	--	--	1.2E+02	4.0E+02	--	--	1.2E+02	4.2E+02	--	--	1.2E+01	4.0E+01	--	--	1.2E+01	4.2E+01	--	--	1.2E+01	4.2E+01
Chlorpyrifos	0	8.3E-02	4.1E-02	--	--	8.3E-02	4.1E-02	--	--	2.1E-02	1.0E-02	--	--	2.1E-02	1.0E-02	--	--	2.1E-02	1.0E-02	--	--
Chromium III	0	1.8E+02	2.4E+01	--	--	1.8E+02	2.4E+01	--	--	4.6E+01	6.0E+00	--	--	4.6E+01	6.0E+00	--	--	4.6E+01	6.0E+00	--	--
Chromium VI	0	1.6E+01	1.1E+01	--	--	1.6E+01	1.1E+01	--	--	4.0E+00	2.8E+00	--	--	4.0E+00	2.8E+00	--	--	4.0E+00	2.8E+00	--	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	1.0E+02	--	--	--	1.0E+01	--	--	--	1.0E+01	--	--	--	1.0E+01	--
Chrysene [C]	0	--	--	4.4E-02	4.9E-01	--	--	5.9E-02	6.6E-01	--	--	4.4E-03	4.9E-02	--	--	5.9E-03	6.6E-02	--	--	5.9E-03	6.6E-02
Copper	0	3.7E+00	2.8E+00	1.3E+03	--	3.7E+00	2.8E+00	1.4E+03	--	9.1E-01	6.9E-01	1.3E+02	--	9.2E-01	6.9E-01	1.4E+02	--	9.2E-01	6.9E-01	1.4E+02	--
Cyanide	0	2.2E+01	5.2E+00	7.0E+02	2.2E+05	2.2E+01	5.2E+00	7.3E+02	2.2E+05	5.5E+00	1.3E+00	7.0E+01	2.2E+04	5.5E+00	1.3E+00	7.3E+01	2.2E+04	5.5E+00	1.3E+00	7.3E+01	2.2E+04
DDD [C]	0	--	--	8.3E-03	8.4E-03	--	--	1.1E-02	1.1E-02	--	--	8.3E-04	8.4E-04	--	--	1.1E-03	1.1E-03	--	--	1.1E-03	1.1E-03
DDE [C]	0	--	--	5.9E-03	5.9E-03	--	--	7.9E-03	7.9E-03	--	--	5.9E-04	5.9E-04	--	--	7.9E-04	7.9E-04	--	--	7.9E-04	7.9E-04
DDT [C]	0	1.1E+00	1.0E-03	5.9E-03	5.9E-03	1.1E+00	1.0E-03	7.9E-03	7.9E-03	2.8E-01	2.5E-04	5.9E-04	5.9E-04	2.8E-01	2.5E-04	7.9E-04	7.9E-04	2.8E-01	2.5E-04	7.9E-04	7.9E-04
Demeton	0	--	1.0E-01	--	--	--	1.0E-01	--	--	--	2.5E-02	--	--	--	2.5E-02	--	--	--	2.5E-02	--	--
Dibenz(a,h)anthracene [C]	0	--	--	4.4E-02	4.9E-01	--	--	5.9E-02	6.6E-01	--	--	4.4E-03	4.9E-02	--	--	5.9E-03	6.6E-02	--	--	5.9E-03	6.6E-02
Dibutyl phthalate	0	--	--	2.7E+03	1.2E+04	--	--	2.8E+03	1.2E+04	--	--	2.7E+02	1.2E+03	--	--	2.8E+02	1.2E+03	--	--	2.8E+02	1.2E+03
Dichloromethane (Methylene Chloride) [C]	0	--	--	4.7E+01	1.6E+04	--	--	6.3E+01	2.1E+04	--	--	4.7E+00	1.6E+03	--	--	6.3E+00	2.1E+03	--	--	6.3E+00	2.1E+03
1,2-Dichlorobenzene	0	--	--	2.7E+03	1.7E+04	--	--	2.8E+03	1.8E+04	--	--	2.7E+02	1.7E+03	--	--	2.8E+02	1.8E+03	--	--	2.8E+02	1.8E+03
1,3-Dichlorobenzene	0	--	--	4.0E+02	2.6E+03	--	--	4.2E+02	2.7E+03	--	--	4.0E+01	2.6E+02	--	--	4.2E+01	2.7E+02	--	--	4.2E+01	2.7E+02
1,4-Dichlorobenzene	0	--	--	4.0E+02	2.6E+03	--	--	4.2E+02	2.7E+03	--	--	4.0E+01	2.6E+02	--	--	4.2E+01	2.7E+02	--	--	4.2E+01	2.7E+02
3,3-Dichlorobenzidine[C]	0	--	--	4.0E-01	7.7E-01	--	--	5.4E-01	1.0E+00	--	--	4.0E-02	7.7E-02	--	--	5.4E-02	1.0E-01	--	--	5.4E-02	1.0E-01
Dichlorobromomethane [C]	0	--	--	5.6E+00	4.6E+02	--	--	7.5E+00	6.2E+02	--	--	5.6E-01	4.6E+01	--	--	7.5E-01	6.2E+01	--	--	7.5E-01	6.2E+01
1,2-Dichloroethane [C]	0	--	--	3.8E+00	9.9E+02	--	--	5.1E+00	1.3E+03	--	--	3.8E-01	9.9E+01	--	--	5.1E-01	1.3E+02	--	--	5.1E-01	1.3E+02
1,1-Dichloroethylene	0	--	--	3.1E+02	1.7E+04	--	--	3.2E+02	1.8E+04	--	--	3.1E+01	1.7E+03	--	--	3.2E+01	1.8E+03	--	--	3.2E+01	1.8E+03
1,2-trans-dichloroethylene	0	--	--	7.0E+02	1.4E+05	--	--	7.3E+02	1.5E+05	--	--	7.0E+01	1.4E+04	--	--	7.3E+01	1.5E+04	--	--	7.3E+01	1.5E+04
2,4-Dichlorophenol	0	--	--	9.3E+01	7.9E+02	--	--	9.7E+01	8.2E+02	--	--	9.3E+00	7.9E+01	--	--	9.7E+00	8.2E+01	--	--	9.7E+00	8.2E+01
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	1.0E+02	--	--	--	1.0E+02	--	--	--	1.0E+01	--	--	--	1.0E+01	--	--	--	1.0E+01	--
1,2-Dichloropropane[C]	0	--	--	5.2E+00	3.9E+02	--	--	7.0E+00	5.2E+02	--	--	5.2E-01	3.9E+01	--	--	7.0E-01	5.2E+01	--	--	7.0E-01	5.2E+01
1,3-Dichloropropene	0	--	--	1.0E+01	1.7E+03	--	--	1.0E+01	1.8E+03	--	--	1.0E+00	1.7E+02	--	--	1.0E+00	1.8E+02	--	--	1.0E+00	1.8E+02
Dieldrin [C]	0	2.4E-01	5.6E-02	1.4E-03	1.4E-03	2.4E-01	5.6E-02	1.9E-03	1.9E-03	6.0E-02	1.4E-02	1.4E-04	1.4E-04	6.0E-02	1.4E-02	1.9E-04	1.9E-04	6.0E-02	1.4E-02	1.9E-04	1.9E-04
Diethyl Phthalate	0	--	--	2.3E+04	1.2E+05	--	--	2.4E+04	1.2E+05	--	--	2.3E+03	1.2E+04	--	--	2.4E+03	1.2E+04	--	--	2.4E+03	1.2E+04
Di-2-Ethylhexyl Phthalate [C]	0	--	--	1.8E+01	5.9E+01	--	--	2.4E+01	7.9E+01	--	--	1.8E+00	5.9E+00	--	--	2.4E+00	7.9E+00	--	--	2.4E+00	7.9E+00
2,4-Dimethylphenol	0	--	--	5.4E+02	2.3E+03	--	--	5.6E+02	2.4E+03	--	--	5.4E+01	2.3E+02	--	--	5.6E+01	2.4E+02	--	--	5.6E+01	2.4E+02
Dimethyl Phthalate	0	--	--	3.1E+05	2.9E+06	--	--	3.3E+05	3.0E+06	--	--	3.1E+04	2.9E+05	--	--	3.3E+04	3.0E+05	--	--	3.3E+04	3.0E+05
Di-n-Butyl Phthalate	0	--	--	2.7E+03	1.2E+04	--	--	2.8E+03	1.2E+04	--	--	2.7E+02	1.2E+03	--	--	2.8E+02	1.2E+03	--	--	2.8E+02	1.2E+03
2,4 Dinitrophenol	0	--	--	7.0E+01	1.4E+04	--	--	7.3E+01	1.5E+04	--	--	7.0E+00	1.4E+03	--	--	7.3E+00	1.5E+03	--	--	7.3E+00	1.5E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	1.3E+01	7.65E+02	--	--	1.4E+01	7.9E+02	--	--	1.3E+00	7.7E+01	--	--	1.4E+00	7.9E+01	--	--	1.4E+00	7.9E+01
2,4-Dinitrotoluene [C]	0	--	--	1.1E+00	9.1E+01	--	--	1.5E+00	1.2E+02	--	--	1.1E-01	9.1E+00	--	--	1.5E-01	1.2E+01	--	--	1.5E-01	1.2E+01
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	1.2E-06	1.2E-06	--	--	1.2E-06	1.2E-06	--	--	1.2E-07	1.2E-07	--	--	1.2E-07	1.2E-07	--	--	1.2E-07	1.2E-07
1,2-Diphenylhydrazine[C]	0	--	--	4.0E-01	5.4E+00	--	--	5.4E-01	7.3E+00	--	--	4.0E-02	5.4E-01	--	--	5.4E-02	7.3E-01	--	--	5.4E-02	7.3E-01
Alpha-Endosulfan	0	2.2E-01	5.6E-02	1.1E+02	2.4E+02	2.2E-01	5.6E-02	1.1E+02	2.5E+02	5.5E-02	1.4E-02	1.1E+01	2.4E+01	5.5E-02	1.4E-02	1.1E+01	2.5E+01	5.5E-02	1.4E-02	1.1E+01	2.5E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	1.1E+02	2.4E+02	2.2E-01	5.6E-02	1.1E+02	2.5E+02	5.5E-02	1.4E-02	1.1E+01	2.4E+01	5.5E-02	1.4E-02	1.1E+01	2.5E+01	5.5E-02	1.4E-02	1.1E+01	2.5E+01
Endosulfan Sulfate	0	--	--	1.1E+02	2.4E+02	--	--	1.1E+02	2.5E+02	--	--	1.1E+01	2.4E+01	--	--	1.1E+01	2.5E+01	--	--	1.1E+01	2.5E+01
Endrin	0	8.6E-02	3.6E-02	7.6E-01	8.1E-01	8.6E-02	3.6E-02	7.9E-01	8.4E-01	2.2E-02	9.0E-03	7.6E-02	8.1E-02	2.2E-02	9.0E-03	7.9E-02	8.4E-02	2.2E-02	9.0E-03	7.9E-02	8.4E-02
Endrin Aldehyde	0	--	--	7.6E-01	8.1E-01	--	--	7.9E-01	8.4E-01	--	--	7.6E-02	8.1E-02	--	--	7.9E-02	8.4E-02	--	--	7.9E-02	8.4E-02

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	HH
Ethylbenzene	0	--	--	3.1E+03	2.9E+04	--	--	3.2E+03	3.0E+04	--	--	3.1E+02	2.9E+03	--	--	3.2E+02	3.0E+03	--	--	**3.2E+02**	**3.0E+03**
Fluoranthene	0	--	--	3.0E+02	3.7E+02	--	--	3.1E+02	3.8E+02	--	--	3.0E+01	3.7E+01	--	--	3.1E+01	3.8E+01	--	--	3.1E+01	**3.8E+01**
Fluorene	0	--	--	1.3E+03	1.4E+04	--	--	1.4E+03	1.5E+04	--	--	1.3E+02	1.4E+03	--	--	1.4E+02	1.5E+03	--	--	**1.4E+02**	**1.5E+03**
Foaming Agents	0	--	--	5.0E+02	--	--	--	5.2E+02	--	--	--	5.0E+01	--	--	--	5.2E+01	--	--	--	**5.2E+01**	--
Guthion	0	--	1.0E-02	--	--	--	1.0E-02	--	--	--	2.5E-03	--	--	--	2.5E-03	--	--	--	**2.5E-03**	--	--
Heptachlor [C]	0	5.2E-01	3.8E-03	2.1E-03	2.1E-03	5.2E-01	3.8E-03	2.8E-03	2.8E-03	1.3E-01	9.5E-04	2.1E-04	2.1E-04	1.3E-01	9.6E-04	2.8E-04	2.8E-04	**1.3E-01**	**9.6E-04**	**2.8E-04**	**2.8E-04**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	1.0E-03	1.1E-03	5.2E-01	3.8E-03	1.3E-03	1.5E-03	1.3E-01	9.5E-04	1.0E-04	1.1E-04	1.3E-01	9.6E-04	1.3E-04	1.5E-04	**1.3E-01**	**9.6E-04**	**1.3E-04**	**1.5E-04**
Hexachlorobenzene[C]	0	--	--	7.5E-03	7.7E-03	--	--	1.0E-02	1.0E-02	--	--	7.5E-04	7.7E-04	--	--	1.0E-03	1.0E-03	--	--	**1.0E-03**	**1.0E-03**
Hexachlorobutadiene[C]	0	--	--	4.4E+00	5.0E+02	--	--	5.9E+00	6.7E+02	--	--	4.4E-01	5.0E+01	--	--	5.9E-01	6.7E+01	--	--	**5.9E-01**	**6.7E+01**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	3.9E-02	1.3E-01	--	--	5.2E-02	1.7E-01	--	--	3.9E-03	1.3E-02	--	--	5.2E-03	1.7E-02	--	--	**5.2E-03**	**1.7E-02**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	1.4E-01	4.6E-01	--	--	1.9E-01	6.2E-01	--	--	1.4E-02	4.6E-02	--	--	1.9E-02	6.2E-02	--	--	**1.9E-02**	**6.2E-02**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	--	1.9E-01	6.3E-01	9.5E-01	--	2.6E-01	8.5E-01	2.4E-01	--	1.9E-02	6.3E-02	2.4E-01	--	2.6E-02	8.5E-02	**2.4E-01**	--	**2.6E-02**	**8.5E-02**
Hexachlorocyclopentadiene	0	--	--	2.4E+02	1.7E+04	--	--	2.5E+02	1.8E+04	--	--	2.4E+01	1.7E+03	--	--	2.5E+01	1.8E+03	--	--	**2.5E+01**	**1.8E+03**
Hexachloroethane[C]	0	--	--	1.9E+01	8.9E+01	--	--	2.6E+01	1.2E+02	--	--	1.9E+00	8.9E+00	--	--	2.6E+00	1.2E+01	--	--	**2.6E+00**	**1.2E+01**
Hydrogen Sulfide	0	--	2.0E+00	--	--	--	2.0E+00	--	--	--	5.0E-01	--	--	--	5.0E-01	--	--	--	**5.0E-01**	--	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	4.4E-02	4.9E-01	--	--	5.9E-02	6.6E-01	--	--	4.4E-03	4.9E-02	--	--	5.9E-03	6.6E-02	--	--	**5.9E-03**	**6.6E-02**
Iron	0	--	--	3.0E+02	--	--	--	3.1E+02	--	--	--	3.0E+01	--	--	--	3.1E+01	--	--	--	**3.1E+01**	--
Isophorone[C]	0	--	--	3.6E+02	2.6E+04	--	--	4.8E+02	3.5E+04	--	--	3.6E+01	2.6E+03	--	--	4.8E+01	3.5E+03	--	--	**4.8E+01**	**3.5E+03**
Kepone	0	--	0.0E+00	--	--	--	0.0E+00	--	--	--	0.0E+00	--	--	--	0.0E+00	--	--	--	**0.0E+00**	--	--
Lead	0	2.0E+01	2.3E+00	1.5E+01	--	2.1E+01	2.3E+00	1.6E+01	--	5.1E+00	5.8E-01	1.5E+00	--	5.1E+00	5.9E-01	1.6E+00	--	**5.1E+00**	**5.9E-01**	**1.6E+00**	--
Malathion	0	--	1.0E-01	--	--	--	1.0E-01	--	--	--	2.5E-02	--	--	--	2.5E-02	--	--	--	**2.5E-02**	--	--
Manganese	0	--	--	5.0E+01	--	--	--	5.2E+01	--	--	--	5.0E+00	--	--	--	5.2E+00	--	--	--	**5.2E+00**	--
Mercury	0	1.4E+00	7.7E-01	5.0E-02	5.1E-02	1.4E+00	7.7E-01	5.2E-02	5.3E-02	3.5E-01	1.9E-01	5.0E-03	5.1E-03	3.5E-01	1.9E-01	5.2E-03	5.3E-03	**3.5E-01**	**1.9E-01**	**5.2E-03**	**5.3E-03**
Methyl Bromide	0	--	--	4.8E+01	4.0E+03	--	--	5.0E+01	4.2E+03	--	--	4.8E+00	4.0E+02	--	--	5.0E+00	4.2E+02	--	--	**5.0E+00**	**4.2E+02**
Methoxychlor	0	--	3.0E-02	1.0E+02	--	--	3.0E-02	1.0E+02	--	--	7.5E-03	1.0E+01	--	--	7.5E-03	1.0E+01	--	--	**7.5E-03**	**1.0E+01**	--
Mirex	0	--	0.0E+00	--	--	--	0.0E+00	--	--	--	0.0E+00	--	--	--	0.0E+00	--	--	--	**0.0E+00**	--	--
Monochlorobenzene	0	--	--	6.8E+02	2.1E+04	--	--	7.1E+02	2.2E+04	--	--	6.8E+01	2.1E+03	--	--	7.1E+01	2.2E+03	--	--	7.1E+01	**2.2E+03**
Nickel	0	5.7E+01	6.3E+00	6.1E+02	4.6E+03	5.7E+01	6.3E+00	6.3E+02	4.8E+03	1.4E+01	1.6E+00	6.1E+01	4.6E+02	1.4E+01	1.6E+00	6.3E+01	4.8E+02	**1.4E+01**	**1.6E+00**	**6.3E+01**	4.8E+02
Nitrate (as N)	0	--	--	1.0E+04	--	--	--	1.0E+04	--	--	--	1.0E+03	--	--	--	1.0E+03	--	--	--	**1.0E+03**	--
Nitrobenzene	0	--	--	1.7E+01	1.9E+03	--	--	1.8E+01	2.0E+03	--	--	1.7E+00	1.9E+02	--	--	1.8E+00	2.0E+02	--	--	1.8E+00	**2.0E+02**
N-Nitrosodimethylamine[C]	0	--	--	6.9E-03	8.1E+01	--	--	9.3E-03	1.1E+02	--	--	6.9E-04	8.1E+00	--	--	9.3E-04	1.1E+01	--	--	**9.3E-04**	**1.1E+01**
N-Nitrosodiphenylamine[C]	0	--	--	5.0E+01	1.6E+02	--	--	6.7E+01	2.1E+02	--	--	5.0E+00	1.6E+01	--	--	6.7E+00	2.1E+01	--	--	**6.7E+00**	**2.1E+01**
N-Nitrosodi-n-propylamine[C]	0	--	--	5.0E-02	1.4E+01	--	--	6.7E-02	1.9E+01	--	--	5.0E-03	1.4E+00	--	--	6.7E-03	1.9E+00	--	--	**6.7E-03**	**1.9E+00**
Parathion	0	6.5E-02	1.3E-02	--	--	6.5E-02	1.3E-02	--	--	1.6E-02	3.3E-03	--	--	1.6E-02	3.3E-03	--	--	**1.6E-02**	**3.3E-03**	--	--
PCB-1016	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	3.5E-03	--	--	--	3.5E-03	--	--	--	**3.5E-03**	--	--
PCB-1221	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	3.5E-03	--	--	--	3.5E-03	--	--	--	**3.5E-03**	--	--
PCB-1232	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	3.5E-03	--	--	--	3.5E-03	--	--	--	**3.5E-03**	--	--
PCB-1242	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	3.5E-03	--	--	--	3.5E-03	--	--	--	**3.5E-03**	--	--
PCB-1248	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	3.5E-03	--	--	--	3.5E-03	--	--	--	**3.5E-03**	--	--
PCB-1254	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	3.5E-03	--	--	--	3.5E-03	--	--	--	**3.5E-03**	--	--
PCB-1260	0	--	1.4E-02	--	--	--	1.4E-02	--	--	--	3.5E-03	--	--	--	3.5E-03	--	--	--	**3.5E-03**	--	--
PCB Total[C]	0	--	--	1.7E-03	1.7E-03	--	--	2.3E-03	2.3E-03	--	--	1.7E-04	1.7E-04	--	--	2.3E-04	2.3E-04	--	--	**2.3E-04**	**2.3E-04**

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**
Pentachlorophenol [C]	0	8.7E+00	6.6E+00	2.8E+00	8.2E+01	8.7E+00	6.7E+00	3.8E+00	1.1E+02	2.2E+00	1.7E+00	2.8E-01	8.2E+00	2.2E+00	1.7E+00	3.8E-01	1.1E+01	**2.2E+00**	**1.7E+00**	**3.8E-01**	**1.1E+01**
Phenol	0	--	--	2.1E+04	4.6E+06	--	--	2.2E+04	4.8E+06	--	--	2.1E+03	4.6E+05	--	--	2.2E+03	4.8E+05	--	--	**2.2E+03**	**4.8E+05**
Pyrene	0	--	--	9.6E+02	1.1E+04	--	--	1.0E+03	1.1E+04	--	--	9.6E+01	1.1E+03	--	--	1.0E+02	1.1E+03	--	--	**1.0E+02**	**1.1E+03**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gross Alpha Activity	0	--	--	1.5E+01	1.5E+01	--	--	1.6E+01	1.6E+01	--	--	1.5E+00	1.5E+00	--	--	1.6E+00	1.6E+00	--	--	**1.6E+00**	**1.6E+00**
Beta and Photon Activity (mrem/yr)	0	--	--	4.0E+00	4.0E+00	--	--	4.2E+00	4.2E+00	--	--	4.0E-01	4.0E-01	--	--	4.2E-01	4.2E-01	--	--	**4.2E-01**	**4.2E-01**
Strontium-90	0	--	--	8.0E+00	8.0E+00	--	--	8.3E+00	8.3E+00	--	--	8.0E-01	8.0E-01	--	--	8.3E-01	8.3E-01	--	--	**8.3E-01**	**8.3E-01**
Tritium	0	--	--	2.0E+04	2.0E+04	--	--	2.1E+04	2.1E+04	--	--	2.0E+03	2.0E+03	--	--	2.1E+03	2.1E+03	--	--	**2.1E+03**	**2.1E+03**
Selenium	0	2.0E+01	5.0E+00	1.7E+02	1.1E+04	2.0E+01	5.0E+00	1.8E+02	1.1E+04	5.0E+00	1.3E+00	1.7E+01	1.1E+03	5.0E+00	1.3E+00	1.8E+01	1.1E+03	**5.0E+00**	**1.3E+00**	**1.8E+01**	**1.1E+03**
Silver	0	3.2E-01	--	--	--	3.2E-01	--	--	--	8.0E-02	--	--	--	6.0E-02	--	--	--	**8.0E-02**	--	--	--
Sulfate	0	--	--	2.5E+05	--	--	--	2.6E+05	--	--	--	2.5E+04	--	--	--	2.6E+04	--	--	--	**2.6E+04**	--
1,1,2,2-Tetrachloroethane[C]	0	--	--	1.7E+00	1.1E+02	--	--	2.3E+00	1.5E+02	--	--	1.7E-01	1.1E+01	--	--	2.3E-01	1.5E+01	--	--	**2.3E-01**	**1.5E+01**
Tetrachloroethylene[C]	0	--	--	8.0E+00	8.9E+01	--	--	1.1E+01	1.2E+02	--	--	8.0E-01	8.9E+00	--	--	1.1E+00	1.2E+01	--	--	**1.1E+00**	**1.2E+01**
Thallium	0	--	--	1.7E+00	6.3E+00	--	--	1.8E+00	6.5E+00	--	--	1.7E-01	6.3E-01	--	--	1.8E-01	6.5E-01	--	--	**1.8E-01**	**6.5E-01**
Toluene	0	--	--	6.8E+03	2.0E+05	--	--	7.1E+03	2.1E+05	--	--	6.8E+02	2.0E+04	--	--	7.1E+02	2.1E+04	--	--	**7.1E+02**	**2.1E+04**
Total dissolved solids	0	--	--	5.0E+05	--	--	--	5.2E+05	--	--	--	5.0E+04	--	--	--	5.2E+04	--	--	--	**5.2E+04**	--
Toxaphene [C]	0	7.3E-01	2.0E-04	7.3E-03	7.5E-03	7.3E-01	2.0E-04	9.8E-03	1.0E-02	1.8E-01	5.0E-05	7.3E-04	7.5E-04	1.8E-01	5.0E-05	9.8E-04	1.0E-03	**1.8E-01**	**5.0E-05**	**9.8E-04**	**1.0E-03**
Tributyltin	0	4.6E-01	6.3E-02	--	--	4.6E-01	6.3E-02	--	--	1.2E-01	1.6E-02	--	--	1.2E-01	1.6E-02	--	--	**1.2E-01**	**1.6E-02**	--	--
1,2,4-Trichlorobenzene	0	--	--	2.6E+02	9.4E+02	--	--	2.7E+02	9.8E+02	--	--	2.6E+01	9.4E+01	--	--	2.7E+01	9.8E+01	--	--	**2.7E+01**	**9.8E+01**
1,1,2-Trichloroethane[C]	0	--	--	6.0E+00	4.2E+02	--	--	8.1E+00	5.6E+02	--	--	6.0E-01	4.2E+01	--	--	8.1E-01	5.6E+01	--	--	**8.1E-01**	**5.6E+01**
Trichloroethylene [C]	0	--	--	2.7E+01	8.1E+02	--	--	3.6E+01	1.1E+03	--	--	2.7E+00	8.1E+01	--	--	3.6E+00	1.1E+02	--	--	**3.6E+00**	**1.1E+02**
2,4,6-Trichlorophenol [C]	0	--	--	2.1E+01	6.5E+01	--	--	2.8E+01	8.7E+01	--	--	2.1E+00	6.5E+00	--	--	2.8E+00	8.7E+00	--	--	**2.8E+00**	**8.7E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	5.0E+01	--	--	--	5.2E+01	--	--	--	5.0E+00	--	--	--	5.2E+00	--	--	--	**5.2E+00**	--
Vinyl Chloride[C]	0	--	--	2.3E-01	6.1E+01	--	--	3.1E-01	8.2E+01	--	--	2.3E-02	6.1E+00	--	--	3.1E-02	8.2E+00	--	--	**3.1E-02**	**8.2E+00**
Zinc	0	3.6E+01	3.7E+01	9.1E+03	6.9E+04	3.6E+01	3.7E+01	9.5E+03	7.2E+04	9.1E+00	9.2E+00	9.1E+02	6.9E+03	9.1E+00	9.2E+00	9.5E+02	7.2E+03	**9.1E+00**	**9.2E+00**	**9.5E+02**	**7.2E+03**

Notes.

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

Metal	Target Value (SSTV)
Antimony	1.5E+00
Arsenic	1.0E+00
Barium	2.1E+02
Cadmium	5.8E-02
Chromium III	3.6E+00
Chromium VI	1.6E+00
Copper	3.7E-01
Iron	3.1E+01
Lead	3.5E-01
Manganese	5.2E+00
Mercury	5.2E-03
Nickel	9.5E-01
Selenium	7.5E-01
Silver	3.2E-02
Zinc	3.6E+00

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

TRC Tier II

Facility = Henrico WTP
Chemical = TRC
Chronic averaging period = 4
WLAa = 4.8
WLAc = 2.8
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

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 = 4.09520939534905
Average Weekly limit = 4.09520939534905
Average Monthly LImit = 4.09520939534905

The data are:
20000

TRC Tier I

Facility = Henrico WTP
Chemical = TRC
Chronic averaging period = 4
WLAa = 19
WLAc = 11
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

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 = 16.0883226245856
Average Monthly LImit = 16.0883226245856

The data are:
20000

Note: 20000 µg/L was used to force a limitation per Guidance Memorandum 00-2011. All data are in units of µg/L. As indicated above, the TRC limitations using Tier I WLAs are 16 µg/L (monthly average and maximum limitations); Tier II WLAs results in monthly average and maximum TRC limitations of 4.1 µg/L. As the limitations calculated under the Tier II scenario are more stringent, the permit limitations will be 4.1 µg/L (monthly average and maximum).

Ammonia Tier II

Facility = Henrico WTP
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 5000
WLAc = 500
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = 5
Variance = 9
C.V. = 0.6
97th percentile daily values = 12.1670
97th percentile 4 day average = 8.31895
97th percentile 30 day average= 6.03026
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
5

Ammonia Tier I

Facility = Henrico WTP
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 20000
WLAc = 2000
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = 5
Variance = 9
C.V. = 0.6
97th percentile daily values = 12.1670
97th percentile 4 day average = 8.31895
97th percentile 30 day average= 6.03026
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
5

Note: The ammonia data point was estimated in the permit application. All data are in units of µg/L. As indicated, no water quality-base effluent limitation is necessary under either tier scenario. However, antibacksliding prohibits the relaxation of limitations in this case; therefore, the reissued permit will retain the limitations in the permit issuance of 4.0 mg/L

Attachment F

NPDES Industrial Rating Worksheet

NPDES PERMIT RATING WORK SHEET

NPDES NO. VA0091197

- [ ] Regular Addition
- [ ] DiscretionaryAddition
- [ ] Score change, but no status change
- [ ] Deletion

Facility Name: Henrico WTP

~~City:~~ Henrico County

Receiving Water: Deep Run Creek, UT

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: 4941 Other SIC Codes:
Industrial Subcategory Code: _____ (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	[X] 7.	7	35
[ ] 1.	1	5	[ ] 4.	4	20	[ ] 8.	8	40
[ ] 2.	2	10	[ ] 5.	5	25	[ ] 9.	9	45
			[ ] 6.	6	30	[ ] 10.	10	50

Code Number Checked: 7

Total Points Factor 1: 35

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	[X]	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 %	[ ]	51	0
	10 % to <50 %	[ ]	52	20
	> 50 %	[ ]	53	30

Code Checked from Section A or B: 21

Total Points Factor 2: 10

FACTOR 3: Conventional Pollutants NPDES NO:

(only when limited by the permit)

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

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

Code Checked: N/A

Points Scored:____

B. Total Suspended Solids (TSS)

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

Code Checked: 1

Points Scored: 0

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

		Nitrogen Equivalent	*Code*	*Points*
Permit Limits: (check one)	X	< 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: 0

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.

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

☐ 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	X 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: 7

Total Points Factor 4: 15

FACTOR 5: Water Quality Factors

NPDES NO.

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
	Yes	1	10
X	No	2	0

Code Number Checked: A 1 B 1 C 2

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

FACTOR 6: Proximity to Near Coastal Waters

A. *Base Score: Enter flow code here (from Factor 2):* 21

Enter the multiplication factor that corresponds to the flow code: 0.10

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

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

HPRI code checked: 4

Base Score: (HPRI Score) 0 X (Multiplication Factor) .1 = 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
X 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
X No	2	0

Code Number Checked: A 4 B 2 C 2

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

SCORE SUMMARY NPDES NO.

Factor	Description	Total Points
1	Toxic Pollutant Potential	35
2	Flows/Streamflow Volume	10
3	Conventional Pollutants	0
4	Public Health Impacts	15
5	Water Quality Factors	10
6	Proximity to Near Coastal Waters	0
	TOTAL (Factors 1 through 6)	70

S1. Is the total score equal to or greater than 80? ☐ 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: _____

OLD SCORE: _____

Virginia Kelly
Permit Reviewer's Name

(804) 527-5048
Phone Number

19 OCT 07
Date

Attachment G

Application Waiver

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road, Glen Allen, Virginia 23060-6295 804/527-5020

TO: Curt Linderman
FROM: Gina Kelly
DATE: January 4, 2008
SUBJECT: Waiver Request for VA0091197 – Henrico County WTP
COPIES: File (R/W, right)

Please note the following:

- The facility discharges to a public water supply and has a flow rate of 0.70 MGD (based on basin capacity).
- A waiver is requested for BOD, TSS, COD, TOC, and iron.

When this permit was initially issued, an EPA Form 2D was completed. As this facility is not a new discharger and this permit action is a reissuance, the permittee completed the EPA Form 2C as part of the application package. Parts V.A and B of this form require monitoring of various pollutants, including those parameters listed above. As the facility has not had a discharge of process wastewater which required sampling and monitoring, no effluent data is available. Concentrations of these parameters in the intake water were provided.

I recommend approving this waiver. The parameters above are conventional pollutants (not toxics), and the permit currently limits TSS and requires monitoring for dissolved iron (a PWS concern). Having analytical results for these parameters would not affect the draft permit.

☑ Approved ☐ Denied

Comments: As recommended, for this permit cycle only.

Signature

1/7/08
Date

Attachment H

TMDL

COMMONWEALTH OF VIRGINIA
COUNTY OF HENRICO

DEPARTMENT OF PUBLIC UTILITIES

ARTHUR D. PETRINI, P.E.
DIRECTOR
(804) 501-4517

April 1, 2008

RECEIVED
APR 03 2008
PRO

Ms. Virginia E. Kelly
Water Permit Writer
Department of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, Virginia 23060

Reference: Henrico County Water Treatment Facility
VPDES No. VA0091197

Dear Ms. Kelly:

The Department of Public Utilities is in receipt of your letter dated February 11, 2008. I would like to point out that we are not an Industrial Facility and we are not a source of Bacteria to the water that could flow into the on site detention pond.

Base on the facts mentioned above, we are requesting the revisions made in the February 11, 2008 letter be removed from the permit. We should not have as E.coli limitation and any associated monitoring to address bacterial TMDL.

If you have any questions, please do not hesitate to call me at (804) 935-0367 ext. 222.

Sincerely,

Russell Navratil
Division Director
Water Treatment Facility

PARHAM AND HUNGARY SPRING ROADS / P.O. BOX 27032 / RICHMOND, VIRGINIA 23273-7032

Kelly,Virginia

From: Drago.Helene@epamail.epa.gov
Sent: Wednesday, April 09, 2008 3:37 PM
To: Martin,Charles
Cc: Brockenbrough,Allan; Linderman,Curtis; Lazarus,David; Daub,Elleanore; Cunningham,Frederick; kuo.mary@epamail.epa.gov; Smigo,Margaret; Alling,Mark; Kelly,Virginia
Subject: Re: Bacteria TMDLTuckahoe etal

Charles: I have no objections to your proposed modification Helene Drago
USEPA- Region III
3WP30
1650 Arch Street
Philadelphia, PA 19103
215-814-5796
drago.helene@epa.gov

"Martin,Charles" <chmartin@deq.virginia.gov>
04/09/2008 02:24 PM

To
Helene Drago/R3/USEPA/US@EPA

cc
Mary Kuo/R3/USEPA/US@EPA, "Kelly,Virginia" <vekelly@deq.virginia.gov>, "Linderman,Curtis" <cjlinderman@deq.virginia.gov>, "Alling,Mark" <msalling@deq.virginia.gov>, "Smigo,Margaret" <mjstone@deq.virginia.gov>, "Daub,Elleanore" <emdaub@deq.virginia.gov>, "Brockenbrough,Allan" <abrockenbrough@deq.virginia.gov>, "Cunningham,Frederick" <fkcunningham@deq.virginia.gov>, "Lazarus,David" <dslazarus@deq.virginia.gov>

Subject

Helene,
The "Bacteria TMDL for Tuckahoe Creek, Little Tuckahoe Creek, Anderson, Broad, Georges and Readers Branches, and Deep Run in Henrico, Goochland and Hanover Counties, Virginia" was approved by EPA in 2004. Table 7 on page 20 contains the Henrico County Water Treatment Plant, permit number VA0091197. This facility is identified as a municipal minor plant with a design flow of 0.70 mgd and was allocated a bacteria WLA of 1.22 x 10 12 cfu /yr. This facility is a potable water treatment plant rather than a PTP and is correctly classified as an industrial minor.

We are proposing to make the following corrective modifications to this

TMDL:

- Remove the potable water treatment facility (VA0091197) and associated wording from the TMDL report.
- Re-assign the WLA of 1.22 x 1012 cfu /yr as a WLA growth factor in Table 7.

If these proposed corrective modifications to the TMDL report are satisfactory, I will follow up with a documentation letter for our respective files and for posting with this TMDL report on the DEQ TMDL website

Charles Martin
Watershed Programs Section
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

May 28, 2009

Mr. Charles Martin
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Mr. Martin:

The United States Environmental Protection Agency (EPA) has reviewed your request to amend the wasteload allocation (WLA) and the Total Maximum Daily Load (TMDL) for *E. coli* bacteria in the Tuckahoe Creek, Little Tuckahoe Creek, Anderson, Broad, Georges and Readers Branches, and Deep Run, located in Henrico, Goochland and Hanover Counties, Virginia. The requested modifications will:

1. Remove the WLA (1.22×10^{12} cfu/yf) for Henrico County Water Treatment Plant (VA0091197) and reassign it to the WLA for future growth;
2. Provide a new WLA of 6.27×10^{9} cfu/yr for Richmond Country Club (VA0063649); and
3. Include a modified expansion scenario for the Richmond Country Club (VA0063649) WLA.

As indicated in your letter, the proposed modifications equate to less than 1% of the total TMDL value and will not cause any water quality violations. Based upon this information, EPA approves the requested modification to the TMDL. If you have any questions or comments concerning this letter, please do not hesitate to call me at (215) 814- 5796.

Sincerely,

Helene Drago

Helene Drago, Manager
TMDL Program

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