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 Major, Industrial permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260 et seq. The discharge results from the operation of a facility manufacturing synthetic resins, fibers, and sheet products. This permit action includes revised effluent limitations and special conditions, including a Stormwater Management Evaluation requirement.

1. Facility Name and Address: E. I. du Pont de Nemours & Co. (Inc.)
Spruance Plant
5401 Jefferson Davis Highway
Richmond, Virginia 23234

Location: 5401 Jefferson Davis Highway in Chesterfield County

2. SIC Code: 2821, 2297, 2824, and wastewater from the manufacture of gypsum (SIC code 2819) at a non-adjacent site is piped to Spruance for treatment and discharge.

3. Permit No. VA0004669 Permit Expiration Date: January 23, 2007

4. Owner Contact:

Name:	L. Waverly Smith
Title:	Environmental Engineer
Telephone No.:	804/383-2521
Address:	P.O. Box 27001 Richmond, VA 23261

5. Application Received Date: July 28, 2006
Application Administratively Complete Date: September 26, 2007
Application Technically Complete Date: July 18, 2008

Permit Drafted By:	Gina Kelly	Date:	July 18, 2008; revised July 23, 2008; August 4, 2008; August 26, 2008
DEQ Regional Office:	Piedmont Regional Office		
Reviewed By:	Emilee Carpenter	Date:	July 23, 2008
	Curt Linderman	Date:	July 24, 2008
	Kyle Winter	Date:	August 4, 2008
	Central Office	Date:	August 5, 2008

6. Receiving Stream:

	Outfall 001	Outfalls 002 through 009
Name:	James River	Grindall Creek
Basin:	James River (Lower)	James River (Lower)
Subbasin:	N/A	N/A
Section:	1	1a
Class:	II	III
Special Standards:	bb	None
River Mile:	2-JMS103.77	Storm water outfalls 002 through 009 enter Grindall Creek, which enters Falling Creek at river mile 0.22. Falling Creek enters the James River at river mile 2-JMS103.15.
1-Day, 10-Year Low Flow:	445 MGD*	0.02 MGD**
7-Day, 10-Year Low Flow:	500 MGD*	0.02 MGD**
30-Day, 5-Year Low Flow:	712 MGD*	0.06 MGD**
30-Day, 10-Year Low Flow:	641 MGD*	0.03 MGD**
Harmonic Mean Flow:	2107 MGD*	0.17 MGD**
Tidal?	Yes	No
On 303(d) list?	Yes	No

* Outfall 001 discharges into the tidal portion of the James River. The indicated flow is the fresh water flow measured above the tidal zone.

** Based on the flow frequency memorandum performed for the Falling Creek WWTP Grindall Creek Discharges (see **Attachment C**).

7. Operator License Requirements: Class I

8. Reliability Class: None.

9. Permit Characterization:
(X) Existing Discharge
(X) Reissuance
(X) Industrial SIC Codes: 2821, 2824, 2297, 2819
(X) Discharge to 303(d) Listed Segment
(X) Whole Effluent Toxicity Program required
(X) Water Quality Limited
(X) Effluent Limited
(X) Storm Water Management Plan
(X) Private

10. Wastewater Flow and Treatment: Table 1

Outfall Number	Internal Outfall	Wastewater Source	Treatment	Flow* (MGD)
001	101	Wastewater Treatment System (including run-off)	Neutralization, aerated lagoons, stabilization pond with clarifiers as an alternative	5.004
	N/A	Non-contact Cooling Water	None	19.945
	102	Water Filtration Plant	Softeners (brine backflush). Flocculation, gravity thickening, centrifugation, multimedia filtration	0.218
	103	Groundwater Treatment	Dense Nonaqueous Phase Liquid (DNAPL) decanting, filtration, pH adjustment, air stripping, afterburner or carbon adsorption (vapor), carbon adsorption (liquid)	0.160
	N/A	Run-off	None	0.373
002-009		Stormwater	None	Varies

* These flows represent the average flows as presented in the 2006 EPA Form 2C Application.

Sanitary waste is discharged to Chesterfield County's sewerage system.

See **Attachment A** for a facility diagram and process flow chart. The flows presented in Attachment A represent updated flow data from 2007, which indicates an increase in flow at Outfall 001 (i.e. the flows in the table above from 2006 do not equal the flows presented in Attachment A from 2007).

11. Sludge Disposal: Sludge from the water treatment process is landfilled.

12. Discharge Location Description: James River and Grindall Creek
Name of USGS topo map: Drewry's Bluff topo – 099B (See **Attachment B**)

13. Material Storage: Materials used in the manufacturing process are stored under roof cover.

14. Ambient Water Quality Information: Ambient water quality data from an upstream station at river mile 2-JMS104.16 was used in this analysis for Outfall 001 (James River discharge); this station was selected due to the close proximity of the discharge site (i.e. less than ½ mile upstream). For Outfalls 002 through 009, ambient water quality data from a stream characteristically similar to the receiving stream was utilized. Data from a monitoring station on Falling Creek at river mile

2-FAC000.85 was included for informational purposes relating to the ambient quality of the similar Grindall Creek. See **Attachment C**.

15. Antidegradation Review and Comments:
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, James River, is determined to be a Tier 1 waterbody. The Richmond-Crater Water Quality Management Plan allocates BOD and ammonia to multiple dischargers in the segment for the purpose of maintaining dissolved oxygen concentrations at or above the level of the standard. Also see TMDL discussion in # 29 below.

Grindall Creek is determined to be a Tier 1 waterbody. This determination is based on the existence of other discharges to the creek where Water Quality Standards are expected to be maintained, at a minimum. Also see TMDL discussion in # 29 below.

The permit reissuance addresses an existing discharge and includes no increase in the flow at Outfall 001 but does allow an increased flow at internal Outfall 101. The waterbody therefore remains classified as Tier 1.

16. Site Inspection: September 25, 2007; report November 6, 2007 See **Attachment D.**

17. Effluent Screening & Limitation Development:

Mixing Zone Analysis and Model
The permittee submitted a mixing model for the E.I. DuPont Spruance Plant discharge to the James River in 1998 (see **Attachment E**). An allocated impact zone (acute mixing zone) with a radius of 27 feet and total length of 270 feet was established. Based on this model, DEQ approved an acute toxicity limitation of 1.0 TUa (i.e. LC_{50} of 100% effluent).

Previously, DEQ interpreted the stated mixing ratios of 4:1 acute and 7:1 chronic to be five total parts (four parts river to one part effluent) and eight total parts (seven parts James River to one part effluent), respectively. Reexamination of the mixing zone study during the permit reissuance process indicates the 4:1 and 7:1 ratios were intended to be 4 and 7 total parts, respectively (see Tables 1 and 2 of the mixing zone analysis in **Attachment E** as well as the written notes on pg 17 of the study). This error was corrected in this permit reissuance by updating the instream waste concentrations (IWC) accordingly.

Using the equation below, a dilution ratio of 4 total parts (3 river parts) to 1 part effluent was established for the acute mixing ratio.

$$0.25\text{TUa} = \frac{1.0\text{TUa}}{\text{Dilution Factor}} \qquad \text{Eqn (1)}$$

where 0.25 TUa is less than the numeric acute water quality standard of 0.3 TUa established in the Technical Support Document for the WET narrative criteria.

Setting the design flow to 1 part and establishing a total flow of 4 parts, the Instream Waste Concentration (IWC) at the edge of the acute mixing zone was determined by:

$$\text{IWC} = \frac{\text{Q design}}{\text{Q stream} + \text{Q design}}(100\%) = \frac{1}{4}(100\%) = 25\% \qquad \text{Eqn (2)}$$

To achieve that mixing condition in MSTRANTI, the design flow was set to 43.67 MGD (the maximum 30-day average effluent flow) and the 1Q10 stream flow was set to 131.01 MGD, as established using the equation below:

$$\frac{\text{1 part Effluent}}{\text{4 parts Total}} = \frac{\text{Q design}}{\text{Q stream} + \text{Q design}} \qquad \text{Eqn (3)}$$

The mixing zone analysis also established a regulatory mixing zone (RMZ, or chronic mixing zone) with a width of 270 feet and a length of 2700 feet. Revising Eqn (1) above to reflect a chronic criterion of 0.143 TUc results in a calculated dilution factor of 7 (6 parts river, 1 part effluent). Furthermore, Figure A-2 of the model suggests that a WET chronic criterion of 0.143 TUc is within the spatial limitations of the RMZ. Accordingly, a minimum dilution ratio of 7:1 was deemed appropriate, and an IWC at the edge of the RMZ was established at 14%. To achieve this mixing condition in MSTRANTI, the design flow was set to 43.67 MGD and the 7Q10 stream flow was set to 262.02 MGD, as established using the chronic mixing ratio7:1 and the equation above.

As per agency direction, the 30Q5, 30Q10, and harmonic mean flow frequencies were set equivalent to that of the chronic flow frequency.

Current stream data for 1Q10 and 7Q10 flows indicate an increase from those flows on which the model was based. This increase affords the model additional conservatism.

Effluent Data

Attachment F contains the associated raw effluent data. Other data utilized in this permit reissuance can be found in the effluent screening discussion below as well as in the components of **Attachment G**.

Reasonable Potential Evaluation

A review of the Water Quality Criteria Monitoring Data (Permit Attachment A data), DMR data, and data submitted in the permit application indicated a need to examine the potential effects of several parameters of concern. The table below summarizes the parameters of concern at each outfall. Any parameter testing above the QL is considered a parameter of concern; for the purposes of this evaluation, parameters reported as less than the quantification limit were considered absent.

Outfall 001	Outfall 101	Outfall 102	Outfall 103
Fecal coliform	TRC	TRC	Sulfate
Fluoride	Fecal coliform	Nitrate-nitrite	Aluminum
Nitrate-nitrite	Fluoride	Total Radium	Iron
Total organic nitrogen	Nitrate-nitrite	Total Radium 226	Magnesium
O&G	Total organic nitrogen	Sulfate	Manganese
TP	TP	Aluminum	Nickel
TN	Total Alpha	Barium	Zinc
Total Alpha	Total Beta	Boron	Chloroform
Total Beta	Total Radium	Iron	Trichlorofluoromethane
Total Radium	Total Radium 226	Magnesium	HMPA
Total Radium 226	Sulfate	Manganese	Ammonia
Sulfate	Sulfide		
Aluminum	Aluminum		
Barium	Barium		
Boron	Boron		
Iron	Iron		
Magnesium	Magnesium		
Molybdenum	Molybdenum		

Outfall 001	Outfall 101	Outfall 102	Outfall 103
Manganese	Manganese		
Copper	Nickel		
Lead	Silver		
Nickel	Zinc		
Silver	Phenols	-	-
Zinc	di-n-butylphthalate		
Phenols	HMPA		
TRC	Ammonia		
Ammonia			
Chlorides			

Reasonable potential analyses for several parameters which require statistical evaluation (i.e. use of STATS.exe) are included in **Attachment G**.

Because this facility does not discharge into a Public Water Supply (PWS) designated stream, further evaluation of barium, iron, sulfate, and manganese was not necessary.

Additionally, no surface water quality standards exist for nitrate-nitrite, total organic nitrogen, total nitrogen, total phosphorus, oil & grease, total radium, total radium 226, aluminum, magnesium, boron, molybdenum, trichlorofluoromethane, HMPA, and fluoride.

All parameters which demonstrate reasonable potential to exceed established water quality standards were evaluated for the need to establish water quality-based effluent limitations at Outfall 001. Specifically, ammonia, silver, sulfide, and TRC in Outfall 101, TRC in Outfall 102, and ammonia, nickel, and zinc in Outfall 103 were evaluated for water quality concerns based on the concentrations in the final effluent (i.e. Outfall 001).

Discussion of other potential parameters of concern follows.

Radioactivity Data Evaluation

In the application, the values reported for Beta Particle and Photon Activity are in units of concentration (e.g. pCi/L) whereas the applicable water quality standard is an exposure in terms of mrem/yr. The EPA has established this same standard for community potable water systems. Federal Regulation states that compliance with the potable water standard may be assumed if the average annual concentration of Beta Particle and Photon Activity is less than 50 pCi/L and the average annual concentrations of Tritium and Strontium-90 are less than 20,000 pCi/L and 8 pCi/L, respectively. As tabulated below, the Beta Particle and Photon Activity at Outfalls 001 and 101are less than 50 pCi/L. However, sample data for Strontium-90 and Tritium were not available at the time of permit drafting; accordingly, Special Condition C.16 requiring monitoring for these two parameters was incorporated into the draft permit (see Item 22.p below)

The application sampling reported measurable concentrations of total alpha activity at outfalls 001 and 101. As the applicable human health wasteload allocation for this parameter is 110 pCi/L which is significantly higher than either sample result, the reported concentrations of total alpha activity in this effluent are not believed to contribute to WQS violations.

The reported data (in pCi/L) are as follows:

Parameter	Outfall 001	Outfall 101
Beta Particle and Photon Activity	7.20 ± 6.60	5.88 ± 7.14
Total Alpha Activity	-2.14 ± 3.86	2.17 ± 6.48

Fecal Coliform

The application sampling revealed measurable concentrations of fecal coliform at outfalls 001 and 101, 8 N/100 mL and 11N/100 mL, respectively. These outfalls discharge once-through cooling water which originates from the James River. The water withdrawal intake is located within an

area listed as not supporting the Recreation Use due to bacteria impairments. Domestic wastewater from the facility is directed to the Chesterfield County Wastewater Treatment Facilities; no other sources of fecal coliform are associated with the facility's operations. Consequently, no additional monitoring for this parameter is required.

Phenols
The application reported total phenols values of 40 µg/L and 20 µg/L for outfalls 001 and 101, respectively. As the applicable human health waste load allocation for phenols is 3,200,000 µg/L which is significantly higher than either sample result, the reported concentrations of phenols in this effluent are not believed to contribute to WQS violations.

Di-n-butylphthalate
The presence of this parameter is evaluated annually at Outfall 101; additional samples were taken for the reissuance application. The sample results from the May 2006 – May 2008 monitoring period were 38 µg/L, 5 µg/L, <5 µg/L, <5 µg/L, and <5 µg/L. As the applicable human health wasteload allocation for this parameter is 84,000 µg/L which is significantly higher than any sample result, the reported concentrations of di-n-butlyphthalate in this effluent are not believed to contribute to WQS violations.

Chloroform
The presence of this parameter is evaluated monthly at Outfall 103. The four sample results from the May 2006-May 2008 monitoring period were above the quantification level: 3 µg/L, 4 µg/L, 3 µg/L, and 4 µg/L. As the applicable human health wasteload allocation for this parameter is 200,000 µg/L which is significantly higher than any sample result, the reported concentrations of di-n-butlyphthalate in this effluent are not believed to contribute to WQS violations.

Limitation Development and Basis
Attachment G presents the evaluations for several pollutants of concerns. Included in Attachment G are a listing of the sources of data used in MSTRANTI, the MSTRANTI printouts with WQS and WLAs, the reasonable potential analyses for various pollutants of concern, and the STATS.exe evaluations for pollutants under their respective outfalls.

Outfall 001
pH: Water Quality Standards; the permit also establishes time periods when the pH can be outside of the 6.0-9.0 S.U. range (see Item 22.g below).

TRC: Water Quality Based Effluent Limitation; See **Attachment G**.

Total P: Best Engineering Judgment. This parameter and limitation were initially included in the permit in accordance with the State Policy for Nutrient Enriched Waters. This policy has since been superseded with new nutrient regulations and guidelines and the issuance of the Nutrient General Permit. While the nutrient general permit limitations are more stringent than the current limitation, these limitations are not effective until 2010. Thus the 2.0 mg/L TP limitation will remain in effect to avoid antibacksliding concerns. The loading limitation was updated to reflect the current, maximum 30-day average of 43.67 MGD.

Ammonia: Best Engineering Judgment; Monitoring only. See Outfall 101 for discussion regarding the application of the ammonia allocation from the Richmond Crater Water Quality Management Plan; see **Attachment G** for the WQS based evaluation.

Temperature: Best Engineering Judgment. See **Attachment J**.

$cBOD_5$: Best Engineering Judgment. Monitoring only; see **Attachment I** for discussion regarding the application of the $cBOD_5$ allocation from the Richmond Crater Water Quality Management Plan.

DO: Water Quality Standards (WQS, 9 VAC 25-260-185). The amended WQS establish minimum DO concentrations of equal to or greater than 5.0 mg/L (instantaneous minimum) and equal to or greater than 6.0 mg/L (7-day mean) for migratory fish spawning and nursery; these WQS are

applicable February 1 through May 31. The open water DO WQS are applicable year round and require a 30-day mean equal to or greater than 5.5 mg/L, a 7-day mean equal to or greater than 4.0 mg/L, and an instantaneous minimum equal to or greater than 3.2 mg/L. The Richmond Crater plan requires a monthly average minimum DO of 2.9 mg/L during the winter months and 4.4 mg/L during the summer months; as these limitations are less stringent that those required in the water quality standards, the permit limitations are based on the water quality standards alone.

Perfluorooctanoic acid (PFOA): Best Engineering Judgment. Monitoring only. PFOA is a chemical associated with a Teflon process previously employed onsite; the 2002 permit requires monitoring which is being retained in the draft permit. See **Attachment K** for discussion regarding PFOA and the East Ditch.

Outfall 101

Ammonia: Richmond Crater Water Quality Management Plan (208e plan) – see **Attachment H**; see **Attachment G** for the WQS based evaluation. As this waste stream is the main source of ammonia, the Richmond Crater Water Quality Management Plan (RCWQMP, 208 Plan) allocation for ammonia is most appropriately applied at this point. That allocation is a monthly average of 590 lb/d (267 kg/d) in the summer and 756 lb/d (342 kg/d) during winter months. The daily maximum limitations are twice the monthly average limitations (e.g. 590 lb/d x 2 x 0.4536 = 535 kg/d). These permit limitations are expressed in three significant digits, as in accordance with the underlying standard (i.e. the RCWQMP).

Total Nickel and Total Zinc: Water Quality Based Effluent Limitations. The limitations in the 2002 permit were based on a statistical evaluation of effluent concentration data from a previous permit cycle. As these limitations are more stringent than the limitations required by the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) federal effluent guideline, the 2002 permit limitations are retained to avoid antibacksliding concerns.

Perfluorooctanoic acid (PFOA): Best Engineering Judgment. Monitoring only. PFOA is a chemical associated with a Teflon process previously employed onsite; the 2002 permit requires monitoring which is being retained in this permit. See **Attachment K** for discussion regarding PFOA and the East Ditch.

Hexamethylphosphoramide (HMPA): Best Engineering Judgment. Monitoring only. HMPA is a process chemical previously used by the facility; the 2002 permit requires monitoring which is being retained in this permit.

$cBOD_5$, TSS, Organic Chemicals, Plastics, and Synthetic Fibers parameters: Federal Effluent Guideline. See **Attachment I** for the discussion involving the application of Federal Effluent Guideline (40 CFR 414) which establishes mass loading limitations at Outfall 101.

Outfall 102

TSS: Best Engineering Judgment; these limitations are carried forward from the 2002 permit.

Outfall 103

$cBOD_5$:. Best Engineering Judgment. Monitoring only; see **Attachment I** for discussion regarding the application of the BOD_5 allocation from the Richmond Crater Water Quality Management Plan.

Chloroform, Trichlorofluoromethane, Carbon Disulfide, Dissolved Zinc, HMPA: Best Engineering Judgment. DuPont included information in their 1992 (revised 1993) "Application and Concept Engineering Reports" analyzing these parameters and recommending corresponding effluent limitations. DEQ incorporated these limitations into the 2002 permit reissuance. Accordingly, these monitoring requirements and limitations have been carried forward into this permit reissuance to ensure the groundwater treatment system continues to operate as designed. See **Attachment G**. [Note: the CER included in the referenced attachment includes suggestions for pH limitations; these limits were more appropriately implemented at Outfall 001 in the 2002 permit. Staff continue to believe limiting pH only at the final effluent outfall is appropriate.]

Outfalls 002-009

pH, COD, TSS, Ammonia, TPH, Chromium, Lead, Copper, Nickel: Best Engineering Judgment. These parameters were included in the 1994 and 1999 permit reissuance, in accordance with GM93-010.A, for monitoring based on elevated levels reported in the stormwater permit application for that permit reissuance. This monitoring has been carried forward with subsequent permit reissuance due to the continued variability in the levels of these parameters in the stormwater discharges.

Zinc, TKN, Nitrate-Nitrite: Best Engineering Judgment. The permit includes monitoring for these parameters because they are associated with the activities of the SIC codes 2819, 2821, and 2824. Additionally, application data suggests the presence of these parameters. While the permit manual suggests monitoring for Total Nitrogen, this parameter is adequately addressed via the TKN and Nitrate-Nitrite monitoring. The permit manual also suggests monitoring for aluminum and iron due to the SIC 2819; this facility does not actually manufacture gypsum onsite but merely treats the associated wastewater. Consequently, exposure of stormwater to chemicals used in the manufacturing of gypsum is not a concern at this facility, and monitoring for aluminum and iron is not necessary.

See **Attachment L** for an analysis of stormwater data and the rationale for including the Stormwater Management Evaluation special condition in the permit.

18. Basis for Sludge Use & Disposal Requirements: Not applicable, as this facility does not land apply sludge.

19. Antibacksliding: The draft permit updates several mass loading limitations based on an increase in effluent flow. These revisions are not considered backsliding as the new limitations are based on new information that was not available when the original limitations were developed.

20. Compliance Schedules
Analysis of effluent data (see **Attachment G**) indicated the need to establish more stringent effluent limitations for TRC at Outfall 001; also revisions to the water quality standard regulations led to a new DO limitation. As these are new and more restrictive effluent limitations, respectively, it is appropriate to allow a period of time for the permittee to achieve compliance. However, the facility is already complying with the newly established permit limits for both of these parameters, so no additional time is needed to achieve compliance. Consequently, a compliance schedule for these parameters was not given.

21. Whole Effluent Toxicity (WET) Testing – Part I.B.
The VPDES Permit Regulation, 9 VAC 25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. See **Attachment M** for the WET Evaluation.

22. Special Conditions – Part I.C:
    a. Special Condition C.1 – Notification Levels
    Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 A for all manufacturing, commercial, mining, and silvicultural dischargers.

    b. Special Condition C.2 – 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). Compliance with an approved O&M manual ensures the proper operation and maintenance of the permitted facility which is required by these laws and regulations.

    c. Special Condition C.3 – 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.

d. Special Condition C.4. –Reopeners
Rationale:
   a. 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.
   b. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade.
   c. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

e. Special Condition C.5 – Closure Plan
Rationale: VPDES Permit Regulation, 9 VAC 25-31-190.H allows DEQ to require the submittal of a closure plan when operations at a facility cease.

f. Special Condition C.6. – Water Quality Criteria 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.

g. Special Condition C.7 – pH Excursions
Rationale: 40 CFR 401.17 establishes lengths of time per event and per month during which continuously monitored pH values can be outside the designated range of 6.0 to 9.0 S.U.

h. Special Condition C. 8 – Dissolved Oxygen Requirements
Rationale: This special conditions clarifies the intent and reporting of the DO limitations established in Part I.A

i. Special Condition C.9 – General Permit Clause
Rationale: 9 VAC 25-40-30 D exempts facilities located in the Chesapeake Bay watershed from Total Phosphorus loading limits that are based on the receiving stream's previously being classified as Nutrient Enriched Waters, on the basis that more stringent annual loading limits (i.e., from the Watershed General Permit)apply to such facilities.

j. Special Condition C.10 – CER for Nutrient Upgrade
Rationale: 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. § 62.1-44.16 of the Code of Virginia requires industrial facilities to obtain DEQ approval for proposed discharges of industrial wastewater.

k. Special Condition C.11 – Best Management Practices
Rationale: VPDES Permit Regulation, 9 VAC 25-31-220 K, requires use of best management practices where applicable to control or abate the discharge of pollutants when numeric effluent limits are infeasible or such practices are necessary to carry out the purposes and intent of the Clean Water Act and State Water Control Law. This special condition requires the continued implementation of the approved Best Management Practices (BMP) Plan and revision of the Plan as needed. This same condition is in the 2002 permit. DuPont has combined this Plan with the site Storm Water Pollution Prevention Plan.

l. Special Condition C.12 – Licensed Operator
Rationale: Required by VPDES Permit Regulation 9 VAC 25-31-200 C and the Code of Virginia § 54.1-2300 et seq., Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.).

m. Special Condition C.13 – Groundwater Monitoring
Rationale: Rationale: State Water Control Law § 62.1-44.21 authorizes the Board to request information needed to determine impact on State waters. This condition requires that the permittee implement a ground water monitoring program that is acceptable to DEQ. This wording is different than the special condition in the 2002 permit. This permit does not contain the reopener that is in the standard permit language to modify the permit if the monitoring data indicate a need to incorporate any limitation or condition. This monitoring program addresses a ground water pump-and-treat program that began in May 1994. It also addresses this office's standard practice of monitoring ground water around wastewater pits, ponds, and lagoons.

This divergence from standard permit language was prompted by the issuance of a RCRA Corrective Action Permit by the EPA – See **Attachment N**. Currently, the facility's groundwater monitoring program is not specifically addressed under either the RCRA Corrective Action permit or the VPDES permit. It is the intent of this special condition to define clearly the regulatory program under which groundwater monitoring activities are to be required (i.e. DEQ VPDES permit vs. EPA/DEQ RCRA permit).

The "Performance Monitoring and Sampling Plan for the Onsite Groundwater Extraction System" dated April 1999 establishes the monitoring plan currently acceptable to DEQ. This Plan was included in the 2002 permit renewal application and modified by submittal dated April 30, 1999, which provided revisions to the 2002 permit renewal application.

The RCRA permit references coordination with appropriate DEQ staff as necessary.

n. Special Condition C.14 – 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.

o. Special Condition C.15 – Disposal of Solids from the Water Treatment Plant
Rationale: This special condition requires the continued implementation of the approved solids disposal plan for the solids from the water treatment plant.

p. Special Condition C.16 – Water Quality Standards Testing
Rationale: VPDES Permit Regulation, 9 VAC 25-260, was updated in February 2004 to include 35 new water quality standards. The permittee provided sample results for 33 of the 35 new water quality standards with the reissuance application. DEQ generally requires all of this testing be performed during the application phase of permit reissuance; however, so as to avoid further delay in the reissuance of this permit, testing for the these two parameters has been incorporated into the permit. The monitoring data required in this special condition will be used to evaluate the need for and to develop permit limitations. The permit may be reopened if test results indicate a reasonable potential to affect the environment.

q. Special Condition C.17 – Effluent Monitoring Frequencies
Rationale: Permittees are granted a reduction in monitoring frequency based on a history of permit compliance. To remain eligible for the reduction, the permittee should not have violations related to the effluent limits for which reduced frequencies were granted. If permittees fail to maintain the previous level of performance, the baseline monitoring frequencies should be reinstated for those parameters that were previously granted a monitoring frequency reduction.

23. Storm Water Management and Storm Water Pollution Prevention Plan – Part I.D through Part I.G
Rationale: VPDES Permit Regulation, 9 VAC 25-31-10 defines discharges of storm water from industrial activity in several industrial categories which include SIC codes 2297, 2821, 2824 and 2819. 9 VAC 25-31-120 requires a permit for these discharges. The Storm Water Pollution Prevention Plan requirements of the permit are derived from the VPDES general permit for discharges of storm water associated with industrial activity, 9 VAC 25-151-10 et seq. VPDES Permit Regulation, 9 VAC 25-31-220 K, requires use of best management practices where applicable to control or abate the discharge of pollutants when numeric effluent limits are infeasible or the practices are necessary to achieve effluent limits or to carry out the purpose and intent of the Clean Water Act and State Water Control Law. The permit manual further defines Sector Specific Stormwater Requirements for these SIC codes in Sectors C and V. Permitting staff did not include the sector-specific requirements for Sector V as it is believe that those requirements are adequately addressed elsewhere in the permit.

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

25. Changes to Permit: Table 3: Permit Processing Changes

Outfall	Parameter Changed	Effluent Limits Changed		Monitoring Requirement Changed		Reason for Change	Date
		From	To	From	To		
001	PFOA	-	NL	-	1/Month	See discussion in Item 17 above	8/08
	TRC – Mo Avg	0.088 mg/L	0.038 mg/L	-	-	Re-evaluation indicates the need to establish more stringent TRC limitations.	8/08
	TRC – Daily Max	0.088 mg/L	0.076 mg/L	-	-		8/08
	DO	Monthly Ave 4.4 mg/L	Monthly Ave 5.5 mg/L Weekly Ave 4.0 mg/L Minimum 3.2 mg/L	June-October	June 1 – January 31	Revised in accordance with new WQS (9 VAC 25-260 et al)	8/08
		Monthly Ave 2.9 mg/L	Monthly Ave 5.5 mg/L Weekly Ave 6.0 mg/L Minimum 5.0 mg/L	November – May	February 1 – May 31		
	Total Nitrogen	NL	-	1/Month	-	Monitoring for this parameter is not necessary as it is adequately covered in the Nutrient General Permit	8/08
	Total Phosphorus	431 kg/d	330 kg/d	-	-	Mass loading limitations were revised to reflect a decrease in the flow at this outfall.	8/08
101	$cBOD_5$	272 kg/d 727 kg/d	290 kg/d 750 kg/d	-	-	Mass loading limitations were revised to reflect an increase in the flow at this outfall. The values were also revised with respect to the number of significant digits in the underlying federal effluent guideline, in accordance with GM06-2016 (See Attachment I).	8/08
	TSS	811 kg/d 2535 kg/d	1100 kg/d 3680 kg/d	-	-		
	40 CFR 414.91 parameters	[mass loadings]		-	-		
	Ammonia – winter	343 kg/d 686 kg/d	342 kg/d 685 kg/d	-	-	Revised in accordance with the Richmond Crater Water Quality Management Plan (e.g 268 kg/d NH_3 /0.4536 kg/lb = 591 lb/d which exceeds the 590 lb/d allocation)	8/08
	Ammonia – summer	268 kg/d	267 kg/d	-	-		
	PFOA	-	NL	-	1/Month	See discussion in Item 17 above	8/08
The cover page was revised according to current boiler plate language and format; also, the river basin, section and special standards were updated in accordance with 9 VAC 25-260 et al.							

From	To	Special Condition Changed	Reason for Change	Date
Part I.A.1 footnote (A)	Part I.A.1 footnote (1)	pH excursion requirements	Revised to reflect updated permit	8/08
Part I.A.1 footnote (B)	[deleted]	Compliance Schedule	The compliance schedule for TRC was completed.	8/08
Part I.A.1 footnote (C)	Part I.A.1 footnote (2)	DO requirements	Revised to reflect updated permit	8/08
Part I.A.1 footnote (D)	[deleted]	Total nitrogen	Monitoring for Total nitrogen has been removed form the individual permit.	8/08
Part I.A.1.a	Part I.A.1.a	Preamble and Defining Seasons	Revised; the summer and winter seasons have changed.	8/08
Part I.A.1.b	Part I.A.1.b	Discharge of Solids/Foam	No changes	8/08
	Parts I.A.1.c	Nutrient General Permit	Added for clarity and in accordance with GM07-2008, Amendment #2	8/08
	Par I.A.2 (1) and (2) Part I.A.3 * (footnotes)	Significant figures	Added for clarity	8/08
Part I.A.5.a and Part I.A.6.a	Part I.A.5.a	Stormwater outfalls	Revised to reflect the combining of all permitted stormwater outfalls under one section	8/08
Part I.A.5 footnote (A)	Part I.A.5 footnote (1)	SW Volume	No changes	8/08
Part I.A.5 footnote (B)	Part I.A.5 footnote (2)	SW Sampling	Revised per the current permit manual to require sample collection within the first hour of discharge (as opposed to the first 3 hrs of discharge)	8/08
Part I.A.5 footnote (C)	Part I.A.5 footnote (3)	Metals Sample Form	No changes	8/08
	Part I.A.5 footnote (4)	TPH	Added in accordance with new agency guidance	8/08
Part I.A.5.b	Part I.A.5.b	SW Events and Sampling	Revised to reflect current agency guidance	8/08
Part I.A.5.c and Part I.A.6.b	Part I.A.5.c	Stormwater Management	Revised to reflect current agency guidance and the combining of all permitted stormwater outfalls under one section	8/08
Part I.A.5.d and Part I.A.6.c	Part I.A.5.d	Discharge of Solids/Foam		8/08
Part I.C.10	Part I.B	Whole Effluent Toxicity Testing	Revised per current agency guidance and policy; See Attachment M for discussion and evaluation of the WET testing data reported during the previous permit cycle.	8/08
Part I.C.1	Part I.C.7	pH Excursion	No changes	8/08
Part I.C.2	Part I.C.11	Best Management Practices	No changes	8/08
Part I.C.3	Part I.C.1	Notification Levels	No changes	8/08
Part I.C.4	Part I.C.12	Licensed Operator	No changes	8/08
Part I.C.5	Part I.C.8	Dissolved Oxygen	Revised to reflect the additional DO monitoring limitations and associated reporting	8/08
Part I.C.6	Part I.C.13	Groundwater Monitoring Plan	Revised to specify that the VPDES permit requires the ongoing groundwater monitoring program. Previously, it was believed that the GW monitoring was to be included as a requirement in the RCRA permit; however, that understanding has since changed and the need to clarify has arisen.	8/08
Part I.C.7	Part I.C.4.c	Nutrient Enriched Waters Reopener	Revised per current agency guidance (GM07-2008)	8/08
Part I.C.8	Part I.C.14	Materials Handling	No changes	8/08
Part I.C.9	Part I.C.15	Disposal of WTP Solids	No changes	8/08

From	To	Special Condition Changed	Reason for Change	Date
Part I.C.11	Part I.C.2	O&M Manual	Revised to reflect the development of the O&M Manual in the last permit reissuance	8/08
Part I.C.12	Part I.C.4.a	TMDL Reopener	No changes	8/08
Part I.C.13	Part I.C.3	Compliance Reporting	Revised per current agency guidance (GM06-2016)	8/08
Part I.B	Part I.C.16	Water Quality Monitoring	Required monitoring and reporting submitted with the reissuance application and addendums; however analysis of two additional parameters must be provided	8/08
	Part I.C.5	Closure Plan	New, reflects current agency guidance	8/08
	Part I.C.6	Water Quality Criteria Reopener	New, reflects current agency guidance	8/08
	Part I.C.9	General Permit Clause	New, reflects current agency guidance (per GM07-2008)	8/08
	Part I.C.10	CER for Nutrient Upgrade	New, reflects current agency guidance (per GM07-2008)	8/08
	Part I.C.17	Effluent Monitoring Frequencies	New, reflects current agency guidance regarding facilities with reduced monitoring frequencies	8/08
Part I.D	[deleted]	Schedule of Compliance	The compliance schedule for TRC was completed.	8/08
Part I.E	Parts I.D, E, F, G	Stormwater Special Conditions	Revised per permit manual to include new formatting, updated permit language, and the stormwater management evaluation testing (i.e. WET testing)	8/08
Changes Made in Response to Permittee Comments Received During August 25, 2008 Phone Call With W.Smith				
2008 Part I.B.2		WET Test Reporting Schedule	Revised per permittee request. As the 2008 WET test has already been submitted under the administratively continued permit, another test this year is not necessary.	8/08
2008 Part I.C.3.a		TSS QL	The permittee requested that the TSS QL be increased since their limits are significantly larger than 1.0 mg/L (the current QL). After speaking with management, it was decided to remove the TSS QL from the compliance reporting special condition. The QL is at the discretion of the permittee but "<QL" values can not be treated as zero for loading calculations.	8/08
2008 Part I.D.2		Stormwater Reporting	The requirement for a daily rainfall log was removed; however a sentence was added requiring documentation be submitted to the DEQ should a stormwater sample not be taken as the result of no qualifying event.	8/08
2008 Part I.G.4		Stormwater Toxicity Testing	At the request of the permittee, the testing schedule has been revised to allow more time before the first test is due.	8/08
2008 Fact Sheet, Item 5		Application Received Date	Requested by permittee	8/08

26. Variances/Alternate Limits or Conditions: None.

27. Public Notice Information required by 9 VAC 25-31-280 B:
Publishing Newspaper: *Richmond Times- Dispatch*
Comment period: Start Date: August 28, 2008 End Date: September 29, 2008
Publication Dates August 28, 2008 and September 4, 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

DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief,

informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. DEQ may hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit.

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

28. Additional Comments:

a. Previous Board Action: Consent Special Orders were executed with DuPont – Spruance in August 1976, October 1980, and October 1994, all of which have been satisfied and cancelled. The 1976 Order addressed pH violations. The 1980 Order extended the term of the permit until it could be reissued. The 1994 Order established an implementation schedule for achieving compliance with the effluent limitations on the discharges from DuPont's water treatment plant.

A Consent Special Order was also executed addressing issues of ground water contamination at the site. An Order was initially executed in January 1987 and amended in November 1987. The Order was revised and reissued in July 1990. As EPA issued the facility a RCRA permit, which also deals with ground water contamination issues, the revised July 1990 Order was closed in 2002.

b. Staff Comments:

- This facility is an E4 facility in the Virginia Environmental Excellence Program (VEEP).
- The facility has not received any Warning Letters or Notices of Violation in the past three years so an evaluation of reduced monitoring was performed. Monitoring frequencies for parameters requiring monitoring only and granted reduced monitoring in the 2002 permit were carried forward in this permit reissuance based on Best Engineering Judgment. Monitoring frequencies for parameters with limitations which were previously granted reduced monitoring were reevaluated for continued reduced monitoring in **Attachment O**.
- This facility discharges to a receiving stream section with the special standards "a," "z," and "bb." The facility does not discharge to shellfish waters, therefore, special condition "a" does not apply. Because the location of Outfall 001 is not within the designated boundaries, special standard "z" does not apply. Special standard "bb" refers to Chlorophyll A levels in the James River. The receiving stream was not assessed for that parameter during the 2006 305(b)/303(d) assessment cycle; however, nutrient limitations in the "General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia," registration number VAN040079 will address this parameter.
- This permit expired on January 23, 2007. The permit reissuance did not occur prior to its expiration due to significant challenges regarding the east ditch discharge.

c. Public Comment: None.

29. 303(d) Listed Segments (TMDL): This facility discharges directly to Grindall Creek and the James River. The James River stream segment receiving the effluent is listed for not supporting the Recreation, Aquatic Life, Fish Consumption, and Shallow Water Uses in Category 5 of the 2006 303(d) list; insufficient data existed during the 2006 assessment cycle to assess the Open water DO criteria or the Migratory Spawning Use. The segment is listed as impaired for fecal coliform, Submerged Aquatic Vegetation, and PCBs. Additionally, the segment is listed as having

observed effects for Fish Consumption Use due to a VDH Fish Consumption Advisory for kepone. Grindall Creek was not specifically assessed during the 2006 assessment cycle.

As the facility discharges domestic wastes to Chesterfield County's WWTPs, DuPont- Spruance is not expected to be a source of the bacterial impairment (fecal coliform in the effluent at Outfalls 001 and 101 are due to bacteria in the river intake water; see item #17 above for additional discussion). The facility has provided analytical data indicating the absence of PCBs in the effluent. Additionally, the permit has a minimum DO limitation at the process water outfall. Given these limits and facility information, this facility can neither cause nor contribute to the observed standards violations or the other impairments. The permit contains a re-opener condition that may allow these limits to be modified, in compliance with section 303(d)(4) of the Act once a TMDL is approved. See **Attachment C** for the corresponding TMDL fact sheets.

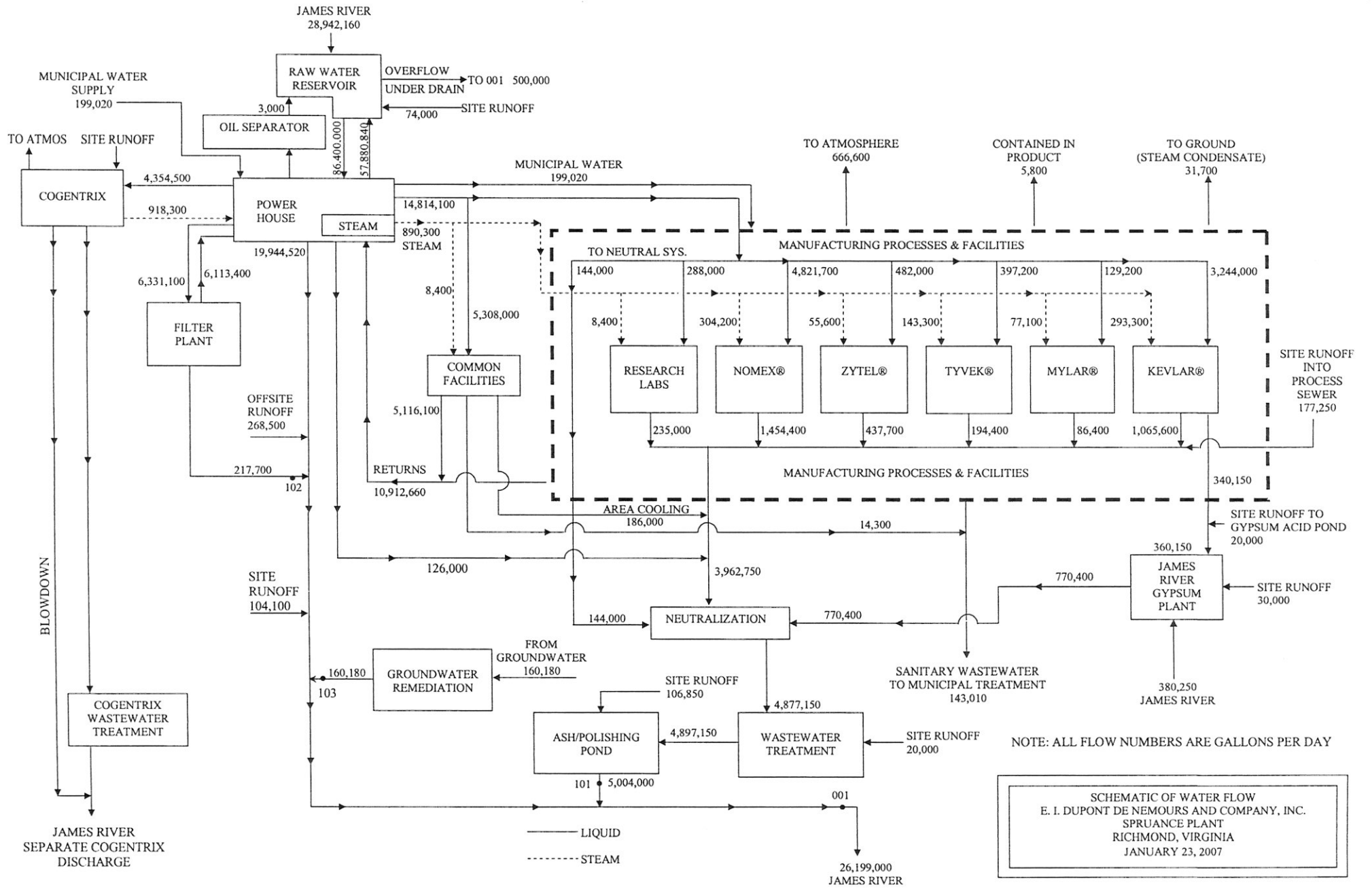
30. NPDES Permit Rating Work Sheet: Total Score 139. See **Attachment P**.

31. Summary of attachments to this Fact Sheet:

Attachment A	Facility Diagram and Process Flow Chart
Attachment B	Location Map
Attachment C	Ambient Data
Attachment D	Site Visit Report and Notes
Attachment E	Mixing Zone Model
Attachment F	Selected Effluent Data
Attachment G	Effluent Limitation Analysis
Attachment H	Richmond Crater Water Quality Management Plan
Attachment I	Application of 40 CFR 414
Attachment J	Temperature Limitation Evaluation
Attachment K	East Ditch Discussion
Attachment L	Stormwater Evaluation
Attachment M	Toxicity Evaluations
Attachment N	RCRA permit
Attachment O	Reduced Monitoring Evaluation
Attachment P	NPDES Industrial Rating Work Sheet

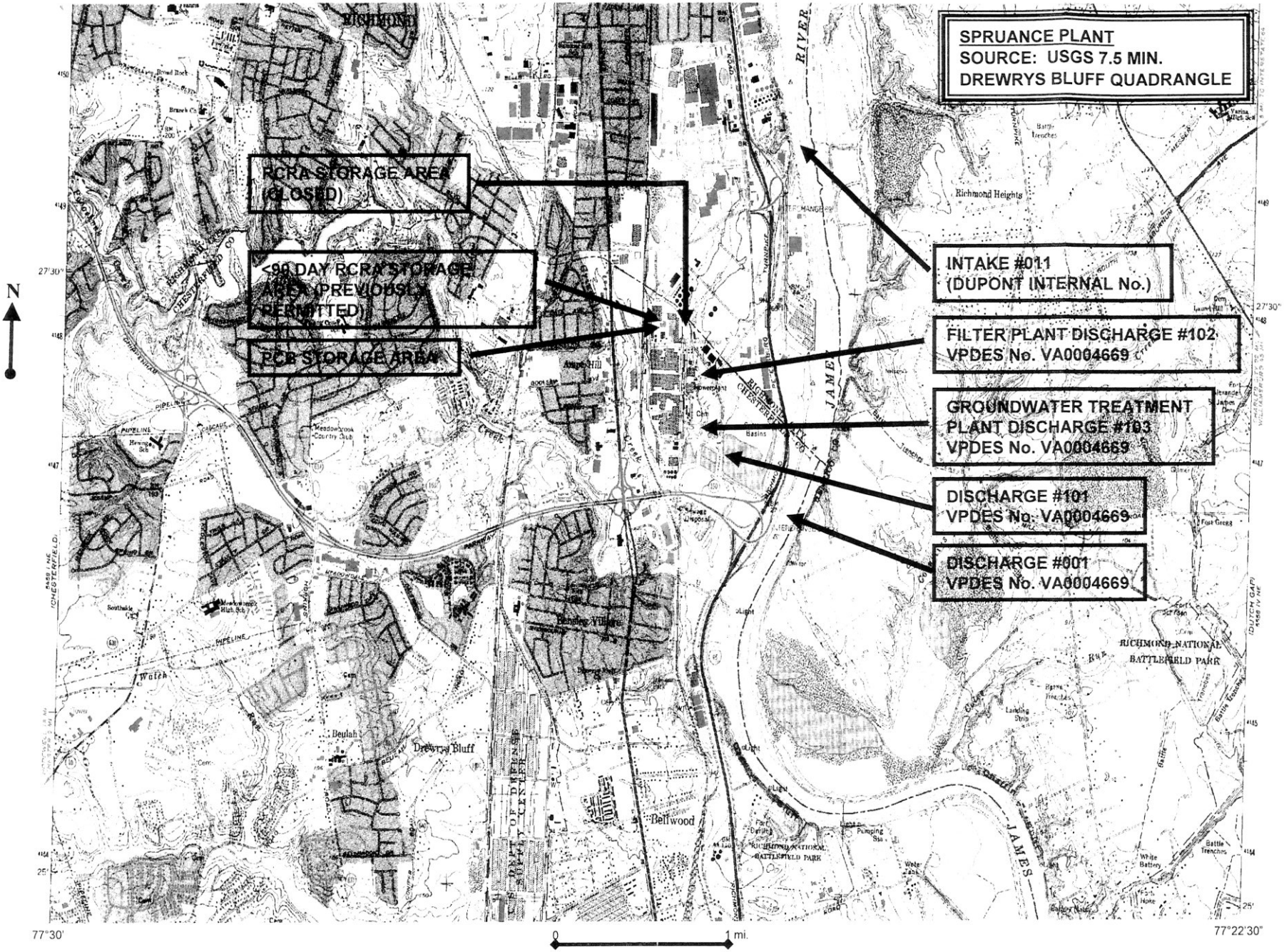
Attachment A

Facility Diagram and Process Flow Chart


JAMES RIVER
28,942,160
RAW WATER RESERVOIR
OVERFLOW
UNDER DRAIN
TO 001 500,000
74,000
SITE RUNOFF
MUNICIPAL WATER SUPPLY
199,020
3,000
OIL SEPARATOR
86,400,000
57,880,840
TO ATMOS
SITE RUNOFF
COGENTRIX
4,354,500
918,300
POWER HOUSE
STEAM
14,814,100
890,300
STEAM
19,944,520
6,331,100
6,113,400
FILTER PLANT
8,400
5,308,000
COMMON FACILITIES
5,116,100
OFFSITE RUNOFF
268,500
217,700
102
RETURNS
10,912,660
MUNICIPAL WATER
199,020
TO ATMOSPHERE
666,600
CONTAINED IN PRODUCT
5,800
TO GROUND
(STEAM CONDENSATE)
31,700
MANUFACTURING PROCESSES & FACILITIES
TO NEUTRAL SYS.
144,000
288,000
4,821,700
482,000
397,200
129,200
3,244,000
8,400
304,200
55,600
143,300
77,100
293,300
RESEARCH LABS
NOMEX®
ZYTEL®
TYVEK®
MYLAR®
KEVLAR®
235,000
1,454,400
437,700
194,400
86,400
1,065,600
SITE RUNOFF INTO PROCESS SEWER
177,250
MANUFACTURING PROCESSES & FACILITIES
340,150
AREA COOLING
186,000
14,300
SITE RUNOFF TO GYPSUM ACID POND
20,000
360,150
JAMES RIVER GYPSUM PLANT
SITE RUNOFF
30,000
770,400
126,000
3,962,750
SITE RUNOFF
104,100
144,000
NEUTRALIZATION
770,400
BLOWDOWN
FROM GROUNDWATER
160,180
160,180
103
GROUNDWATER REMEDIATION
SITE RUNOFF
106,850
4,877,150
SANITARY WASTEWATER TO MUNICIPAL TREATMENT
143,010
380,250
JAMES RIVER
COGENTRIX WASTEWATER TREATMENT
ASH/POLISHING POND
4,897,150
WASTEWATER TREATMENT
SITE RUNOFF
20,000
NOTE: ALL FLOW NUMBERS ARE GALLONS PER DAY
101
5,004,000
001
JAMES RIVER
SEPARATE COGENTRIX
DISCHARGE
LIQUID
STEAM
26,199,000
JAMES RIVER
SCHEMATIC OF WATER FLOW
E. I. DUPONT DE NEMOURS AND COMPANY, INC.
SPRUANCE PLANT
RICHMOND, VIRGINIA
JANUARY 23, 2007

Attachment B

Location


SPRUANCE PLANT
SOURCE: USGS 7.5 MIN.
DREWRYS BLUFF QUADRANGLE
RCRA STORAGE AREA (CLOSED)
<90 DAY RCRA STORAGE AREA (PREVIOUSLY PERMITTED)
PCB STORAGE AREA
INTAKE #011 (DUPONT INTERNAL No.)
FILTER PLANT DISCHARGE #102 VPDES No. VA0004669
GROUNDWATER TREATMENT PLANT DISCHARGE #103 VPDES No. VA0004669
DISCHARGE #101 VPDES No. VA0004669
DISCHARGE #001 VPDES No. VA0004669
N
77°30'
77°22'30"
0
1 mi.

Send To Printer . Back To TerraServer Change to 11x17 Print Size Show Grid Lines Change to Landscape

USGS **Bensley, Virginia, United States** 01 Jul 1994

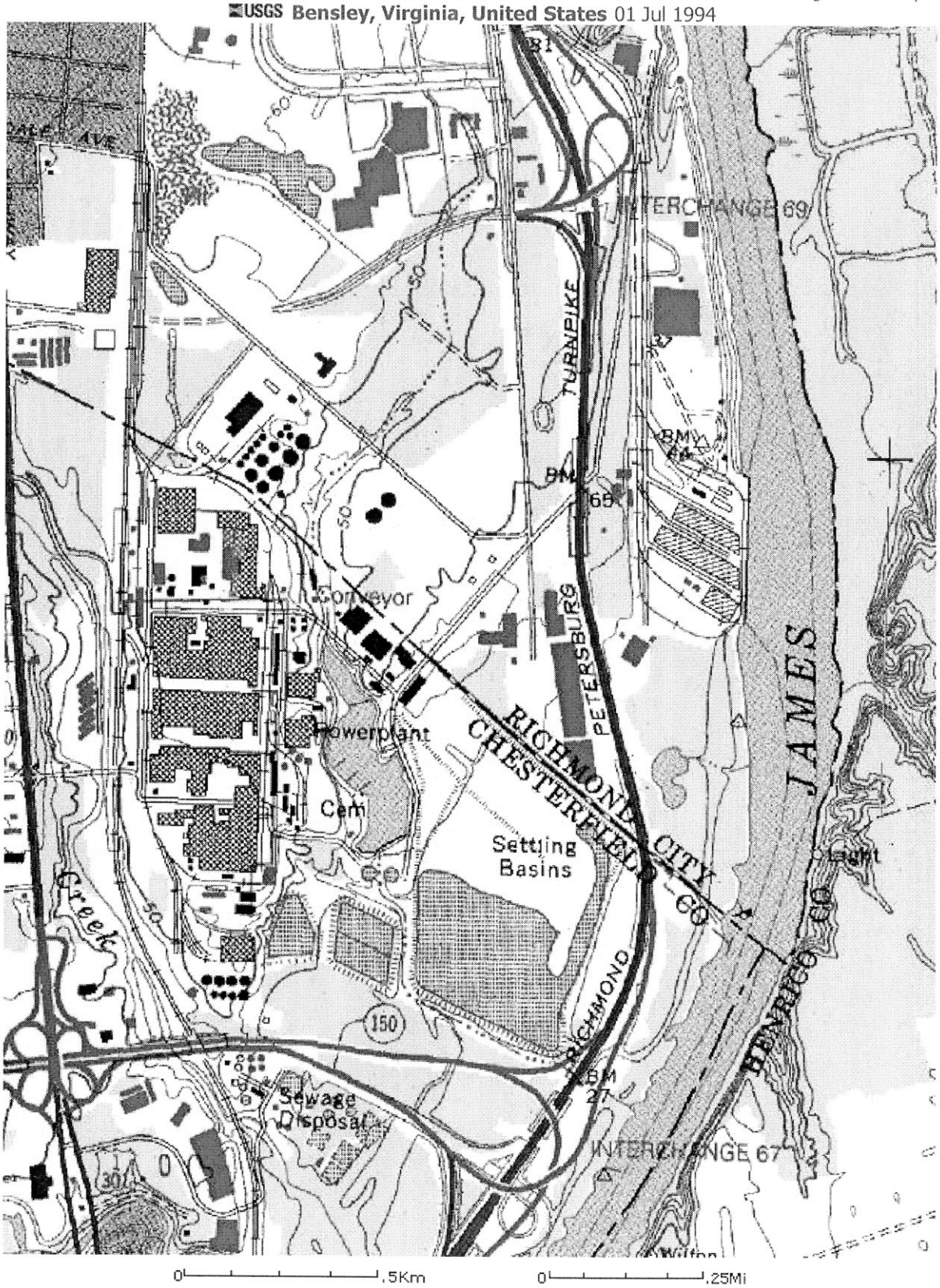


Image courtesy of the U.S. Geological Survey

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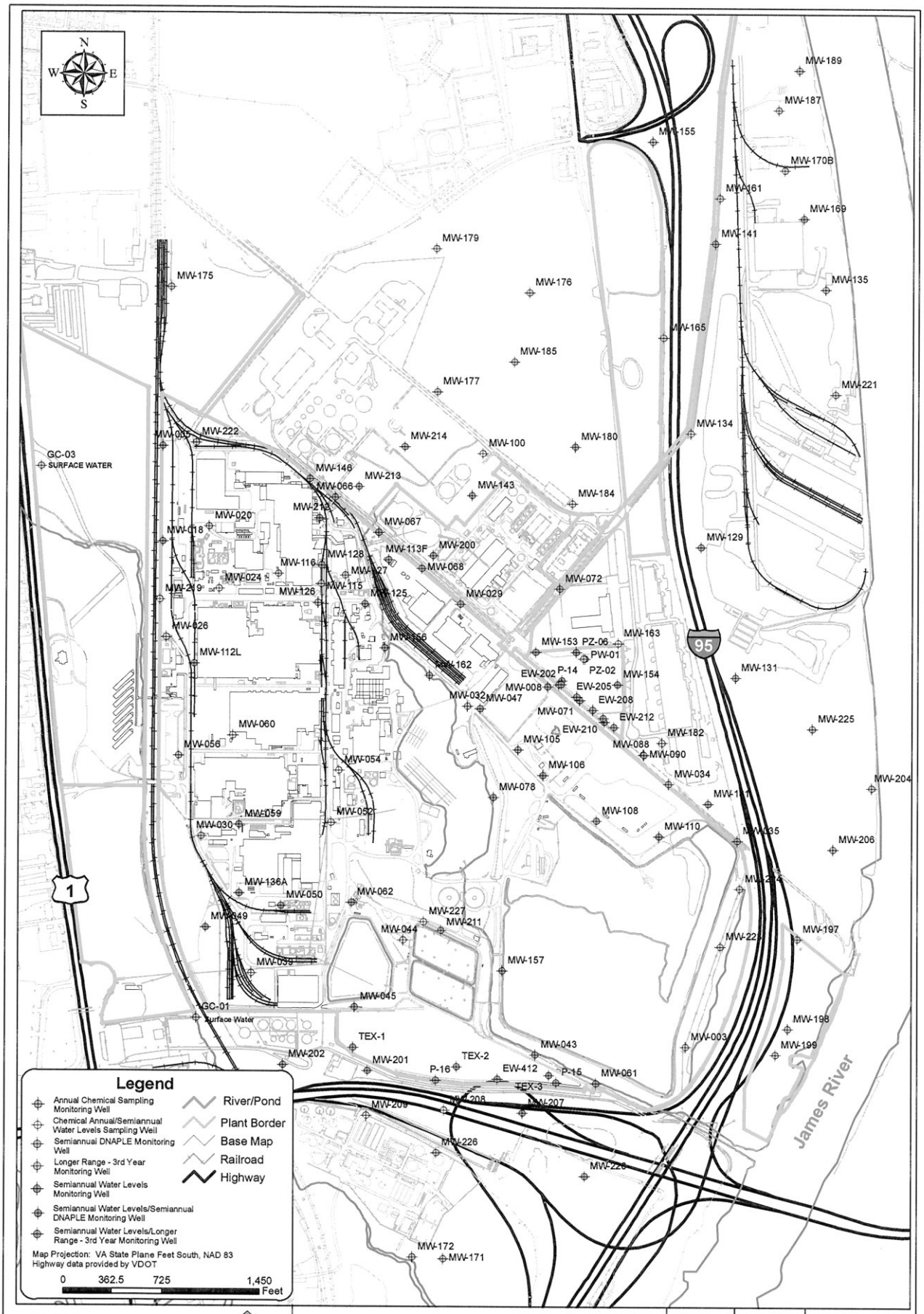


Legend

- Annual Chemical Sampling Monitoring Well
- Chemical Annual/Semiannual Water Levels Sampling Well
- Semiannual DNAPLE Monitoring Well
- Longer Range - 3rd Year Monitoring Well
- Semiannual Water Levels Monitoring Well
- Semiannual Water Levels/Semiannual DNAPLE Monitoring Well
- Semiannual Water Levels/Longer Range - 3rd Year Monitoring Well
- River/Pond
- Plant Border
- Base Map
- Railroad
- Highway

Map Projection: VA State Plane Feet South, NAD 83
Highway data provided by VDOT

0 362.5 725 1,450 Feet

DUPONT

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Corporation - North Carolina
6324 Fairveiw Road
Charlotte, NC 28210

Title: Site Layout with Monitoring Well Locations
DuPont Plant
Spruance, Virginia

Drawn: CMY	Date: 05/29/08	DuPont Project Number:
Revision Number:	Figure Number: 2	URSD Project Number: 18984629

File Name: G:\Spruance\Gis\Project_figures\Annual_GW_Report\2008\Spru_MW_Loc.mxd

Attachment C

Ambient Data

MEMORANDUM

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

SUBJECT: Flow Frequency Determination / 303(d) Status
DuPont Spruance – VA0004669

TO: Ray R. Jenkins

FROM: Jennifer V. Palmore, P.G.

DATE: April 1, 2008

COPIES: File

The DuPont Spruance facility's outfall 001 discharges to the James River near Bellwood, VA. Flow frequencies have been requested at this site for use in developing effluent limitations for the VPDES permit. At the discharge point the river is tidally influenced and flow frequencies cannot be determined. The freshwater inflow into the James River at the fall line is reported, however the current tidal dilution rations should continue to be applied to permit limitations.

The flow frequencies for the freshwater inflow were developed based on a drainage area comparison between the fall line and the USGS continuous record gage on the James River at the Route 45 Bridge in Cartersville (#02035000). The Cartersville gage has been in operation from 1898 through present. However, because the flow in the James is currently regulated by guaranteed released from Gathwright Dam (Lake Moomaw), the flow frequencies for the gage were developed by the Charlottesville office based on data since 1979 only. The data for the reference gage and the fall line are presented below.

James River at Cartersville, VA (#02035000):
Period of record 1980-2003
Drainage area = 6257 mi^2

1Q30 = 540 cfs	High Flow 1Q10 = 1530 cfs
1Q10 = 638 cfs	High Flow 7Q10 = 1810 cfs
7Q10 = 717 cfs	High Flow 30Q10 = 2220 cfs
30Q10 = 918 cfs	HM = 3020 cfs
30Q5 = 1020 cfs	

James River at fall line:
Drainage Area = 6755 mi^2

1Q30 = 583 cfs (377 MGD)	High Flow 1Q10 = 1652 cfs (1068 MGD)
1Q10 = 689 cfs (445 MGD)	High Flow 7Q10 = 1954 cfs (1263 MGD)
7Q10 = 774 cfs (500 MGD)	High Flow 30Q10 = 2397 cfs (1549 MGD)
30Q10 = 991 cfs (641 MGD)	HM = 3260 cfs (2107 MGD)
30Q5 = 1101 cfs (712 MGD)	

This analysis does not address withdrawals, discharges, or springs influencing the flow of the James River between Cartersville and the fall line. The high flow months are January through May.

The James River at the discharge point was assessed as a Category 5A water in the 2006 305(b)/303(d) Water Quality Assessments Integrated Report. The applicable fact sheets are attached.

The James River from the Appomattox River to the Chickahominy River was originally listed on the 1998 list as fully supporting but threatened of the Aquatic Life Use goal based on chlorophyll a violations. During the 1998 cycle, EPA extended the segment upstream to the fall line and downgraded the river to not supporting the Aquatic Life Use, citing nutrient concerns. During the 2006 cycle, the Chesapeake Bay water quality standards were implemented. The Upper Tidal Freshwater James River from the fall line to the Appomattox failed the Shallow Water Use Submerged Aquatic Vegetation criteria. The Open Water Use's 30-day dissolved oxygen criteria was met, however there was insufficient information to assess the other Open Water criteria or the Migratory Spawning Use.

The James River from the fall line to the Appomattox River has been assessed as not supporting of the Recreation use support for fecal coliform since 1996. During the 2004 and 2006 cycles, the bacteria standard changed to E.coli for those stations with enough data. Some of the areas in this segment have converted to the E.coli standard, for others the fecal coliform standard is still in effect. The bacteria TMDL is due in 2010 and is currently under development.

During the 2002 cycle, the James River from the Fall line to Queens Creek has been considered not supporting of the Fish Consumption Use due to PCBs in multiple fish species at multiple DEQ monitoring locations. During the 2004 cycle, the VDH issued a Fish Consumption Restriction. In the 2006 cycle, the restriction was extended on 12/13/2004 and now extends from the I-95 bridge downstream to the Hampton Roads Bridge Tunnel. In addition, the James River and tributaries are considered fully supporting with observed effects for the Fish Consumption Use due to the VDH Fish Consumption Advisory related to kepone.

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

Fact Sheets for Category 5 Waters

RIVER BASIN: James River Basin

STREAM NAME: James River

HYDROLOGIC UNIT: 02080206

TMDL ID: VAP-G01E-01

NEW TMDL ID: 00441

ASSESSMENT CATEGORY: 5A

TMDL DUE DATE: 2010

SEGMENT SIZE: 10.84 - Sq. Mi.

INITIAL LISTING: 1996

UPSTREAM LIMIT:

DESCRIPTION: Fall Line (Mayos Bridge)

RIVER MILE: 110.30

DOWNSTREAM LIMIT:

DESCRIPTION: Appomattox River

RIVER MILE: 77.84

Estuarine James River from the fall line at Mayos Bridge downstream to the Appomattox River.

CLEAN WATER ACT GOAL AND USE SUPPORT:

Recreation Use - Not Supporting

IMPAIRMENT CAUSE: E.coli, Fecal Coliform

Assessed not supporting of the Recreation use support goal based on the results of a summer special study in the fall zone. The special study was designed to monitor the effects of summertime rain and combined sewer overflow (CSO) events on water quality in the James River and to monitor the effects of Richmond's CSO abatement efforts.

The segment has been included on the Impaired Waters list for fecal coliform since 1996. During the 2004 and 2006 cycles, the bacteria standard changed to E.coli for those stations with enough data. Some of the areas in this segment have converted to the E.coli standard, for others the fecal coliform standard is still in effect. The TMDL for both is due in 2010.

Bacteria impairment is noted at the following stations:

2-JMS109.39
2-JMS107.51
2-JMS104.16
2-JMS099.30
2-JMS087.01

IMPAIRMENT SOURCE:

The source of the impairment in this section of the river is believed to be urban runoff from the tributary drainage basin and from combined sewer overflow events from the City of Richmond's combined sewer system.

The City is currently undertaking CSO abatement efforts. It is recommended that the ongoing CSO special study be continued to gauge the effects of CSO abatement efforts on water quality in this segment.

RECOMMENDATION: Problem Characterization

Fact Sheets for Category 5 Waters

RIVER BASIN: James River Basin

STREAM NAME: James River

HYDROLOGIC UNIT: 02080206

TMDL ID: VAP-G01E-03

NEW TMDL ID: 00585/00589/01761

ASSESSMENT CATEGORY: 5A

TMDL DUE DATE: 2014

SEGMENT SIZE: ~325 - Stream miles

INITIAL LISTING: 2002

UPSTREAM LIMIT:

DESCRIPTION: Fall line

RIVER MILE: 110.30

DOWNSTREAM LIMIT:

DESCRIPTION: Hampton Roads Bridge Tunnel

RIVER MILE: 0.00

Estuarine James River from the fall line to the Hampton Roads Bridge Tunnel, including several tributaries listed below.

CLEAN WATER ACT GOAL AND USE SUPPORT:

Fish Consumption Use - Not Supporting

IMPAIRMENT CAUSE: Fish Tissue - PCBs, VDH Fish Consumption Restriction

During the 2002 cycle, the James River from the Fall line to Queens Creek was considered not supporting of the Fish Consumption Use due to PCBs in multiple fish species at multiple DEQ monitoring locations.

During the 2004 cycle, a VDH Fish Consumption Restriction was issued from the fall line to Flowerdew Hundred and the segment was adjusted slightly to match the Restriction.

However, during the 2006 cycle, the restriction was extended on 12/13/2004 and now extends from the I-95 bridge downstream to the Hampton Roads Bridge Tunnel and includes the tidal portions of the following tributaries:

Appomattox River up to Lake Chesdin Dam
Bailey Creek up to Route 630
Bailey Bay
Chickahominy River up to Walkers Dam
Skiffes Creek Dam
Pagan River and its tributary Jones Creek
Chuckatuck Creek
Nansemond River and its tributaries Bennett Creek and Star Creek
Hampton River
Willoughby Bay and the Elizabeth R. system (Western, Eastern, and Southern Branches and Lafayette R.) and tributaries St. Julian Creek, Deep Creek, and Broad Creek

IMPAIRMENT SOURCE:

The source of the PCBs is considered unknown.

RECOMMENDATION: Toxic Source Assessment

Fact Sheets for Category 5 Waters

RIVER BASIN: James River Basin

STREAM NAME: James River Tidal Freshwater and Oligohaline Estuaries

HYDROLOGIC UNIT: 02080206

TMDL ID: VAP-G03E-02

NEW TMDL ID: 00442/01782/10125

ASSESSMENT CATEGORY: 5A

TMDL DUE DATE: 2010

SEGMENT SIZE: 118.34 - Sq. Mi.

INITIAL LISTING: 1998

UPSTREAM LIMIT:

DESCRIPTION: Fall line

RIVER MILE: 110.30

DOWNSTREAM LIMIT:

DESCRIPTION: Chickahominy River

RIVER MILE: 48.40

The James River Tidal Freshwater and Oligohaline Estuaries.

CLEAN WATER ACT GOAL AND USE SUPPORT:

Aquatic Life Use - Not Supporting, Shallow Water Use - Not Supporting, Open Water Use - Not Supporting

IMPAIRMENT CAUSE: Aquatic Macrophytes, Dissolved Oxygen

The mainstem James River from the Appomattox River to the Chickahominy River was originally listed on the 1998 list as fully supporting but threatened of the Aquatic Life Use goal based on chlorophyll a violations. During the 1998 cycle, EPA extended the segment upstream to the fall line and downgraded the river to not supporting the Aquatic Life Use, citing nutrient concerns.

In previous cycles, the mainstem James River had acceptable dissolved oxygen levels. In addition the entire tidal freshwater portion (fall line to just above the Chickahominy River) has good benthic community based on the results from the Chesapeake Bay Benthic Index of Biological Community; therefore the James River from the fall line to the oligohaline boundary was considered impaired solely for Nutrients/Eutrophication Biological Indicators (EPA Overlist).

During the 2006 cycle, the CB water quality standards were implemented. The Upper Tidal Freshwater James River from the fall line to the Appomattox failed the Shallow Water Use SAV criteria. The 30-day Open Water dissolved oxygen criteria were acceptable, but there was insufficient information to assess the other OW criteria or the Migratory Spawning Use.

The Lower Tidal Freshwater and Oligohaline James River segments failed the Shallow Water Use SAV acreage requirements. However, they also failed the 30-day Open Water summer dissolved oxygen criteria. Again, there was insufficient information to assess the other OW criteria or the Migratory Spawning Use.

IMPAIRMENT SOURCE:

The tributary strategy for the James River assigned sources and allocations.

RECOMMENDATION: Tributary Strategy Implementation

MEMORANDUM

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

SUBJECT: Flow Frequency Determination/303(d) Status
Falling Creek WWTP – VA0024996

TO: Gina R. E. Kelly

FROM: Jennifer V. Palmore

DATE: October 15, 2007

COPIES: File

The Chesterfield County's Falling Creek Wastewater Treatment Plant discharges via outfall 001 to the James River and via outfalls 002 and 003 to Grindall Creek. The rivermiles for the outfalls are 2-JMS103.11, 2-GRK000.24, and 2-GRK000.22, respectively. Flow frequencies have been requested for this outfall for use in developing effluent limitations for the VPDES permit.

Outfall 001 – James River

The James River is tidally influenced at the discharge point of outfall 001. Flow frequencies cannot be developed for tidal waters; however, for modeling purposes the freshwater inflow at the fall line of the James River (I-95 bridge) is being included. The flow frequencies were developed based on a drainage area comparison between the fall line and the USGS continuous record gage on the James River at the Route 45 bridge in Cartersville (#02035000). The gage has been in operation from 1898 through present; however because the flow in the James has been regulated since 1979 by guaranteed releases from Gathwright Dam (Lake Moomaw), the flow frequencies for the gage were developed based on data since 1979 only. The data for the reference gage and the fall line are presented below. This analysis does not address the withdrawals and discharges, or any springs influencing the flow of the James River.

James River at Cartersville, VA (#02035000):
Period of record 1979-2003
Drainage area = 6257 mi^2
High Flow Months = January - May

1Q30 = 540 cfs	High Flow 1Q10 = 1530 cfs
1Q10 = 638 cfs	High Flow 7Q10 = 1810 cfs
7Q10 = 717 cfs	High Flow 30Q10 = 2220 cfs
30Q10 = 918 cfs	HM = 3020 cfs
30Q5 = 1020 cfs	

James River at fall line:
Drainage Area = 6755 mi^2

1Q30 = 583 cfs (377 MGD)	High Flow 1Q10 = 1652 cfs (1068 MGD)
1Q10 = 689 cfs (445 MGD)	High Flow 7Q10 = 1954 cfs (1263 MGD)
7Q10 = 774 cfs (500 MGD)	High Flow 30Q10 = 2397 cfs (1549 MGD)
30Q10 = 991 cfs (641 MGD)	HM = 3260 cfs (2107 MGD)
30Q5 = 1101 cfs (712 MGD)	

The James River was considered a Category 5A water in the 2006 305(b)/303(d) Integrated Water Quality Assessment Report. The river was considered impaired of the Fish Consumption Use due to a VDH fish consumption advisory for PCBs. The advisory was based on DEQ monitoring which showed elevated PCB levels in fish tissue collected in the tidal James River and some tributaries. The TMDL is due in 2014. In addition, the river is under a VDH fish consumption advisory for kepone; this is not an impairing cause.

The James River from the Appomattox River to the Chickahominy River was originally listed on the 1998 list as fully supporting but threatened of the Aquatic Life Use goal based on chlorophyll a violations. During the 1998 cycle, EPA extended the segment upstream to the fall line and downgraded the river to not supporting the Aquatic Life Use, citing nutrient concerns. During the 2006 cycle, the Chesapeake Bay Water Quality Standards were implemented. The Upper Tidal Freshwater James River from the fall line to the Appomattox failed the Shallow Water Use SAV criteria. The 30-day Open Water dissolved oxygen criteria were acceptable, but there was insufficient information to assess the other Open Water criteria or the Migratory Spawning Use. The TMDL is due in 2010.

The James River from the fall line to the Appomattox River has been included on the Impaired Waters list for fecal coliform since 1996. The TMDL for bacteria is due in 2010 and is currently under development.

Outfalls 002 and 003 – Grindall Creek

The USGS operated a continuous record gage on Falling Creek near Chesterfield, VA (#02038000) from 1955 through 1994. The gage is located at the Route 651 bridge (Belmont Road) in Chesterfield County. The flow frequencies for Grindall Creek at the discharge point were determined from the Falling Creek flows using drainage area proportion. The flow frequencies for the gage and the discharge point are presented below and do not address any withdrawals, discharges, or springs.

Falling Creek near Chesterfield, VA (#02038000):
Period of record 1955-1994
Drainage area = 32.8 mi^2
High Flow Months = January - April

1Q30 = 0.12 cfs	High Flow 1Q10 = 5.2 cfs
1Q10 = 0.42 cfs	High Flow 7Q10 = 6.3 cfs
7Q10 = 0.50 cfs	High Flow 30Q10 = 11 cfs
30Q10 = 0.73 cfs	HM = 3.9 cfs
30Q5 = 1.5 cfs	

Grindall Creek at Outfalls 002 and 003:
Drainage Area = 2.17 mi^2

1Q30 = 0.01 cfs (0.01 MGD)	High Flow 1Q10 = 0.34 cfs (0.22 MGD)
1Q10 = 0.03 cfs (0.02 MGD)	High Flow 7Q10 = 0.42 cfs (0.27 MGD)
7Q10 = 0.03 cfs (0.02 MGD)	High Flow 30Q10 = 0.73 cfs (0.47 MGD)
30Q10 = 0.05 cfs (0.03 MGD)	HM = 0.26 cfs (0.17 MGD)
30Q5 = 0.10 cfs (0.06 MGD)	

Grindall Creek was not specifically assessed during the 2006 Assessment cycle. The creek is included within the VDH fish consumption advisory for kepone; however, this is not an impairing cause.

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

Ambient Water Quality Monitoring from Station 2-JMS104.16

Collection Date	Hardness	Temp Celcius	Field Ph	Do Probe
02/17/1994 16:05	42.0			
03/21/1994 15:20	55.0			
04/14/1994 15:50	50.0			
05/23/1994 16:35	50.0			
06/09/1994 15:55	66.0			
09/08/1994 15:20	96.0			
10/17/1994 16:10	83.0			
11/30/1994 15:35	69.0			
12/06/1994 16:25	75.0			
01/25/1995 15:30	53.0			
02/27/1995 15:30	54.0			
03/23/1995 16:20	56.0			
04/18/1995 16:15	65.0			
05/23/1995 15:35	40.0			
06/20/1995 16:00	57.0			
07/18/1995 15:50	66.0			
08/23/1995 16:20	90.0			
09/21/1995 15:10	110.0			
10/19/1995 15:55	59.0			
11/20/1995 16:10	65.0			
12/14/1995 15:30	47.0			
01/29/1996 16:00	26.0			
02/20/1996 15:30	86.0			
03/25/1996 15:30	56.0			
04/29/1996 11:00	59.0			
05/15/1996 15:05	50.0			
06/18/1996 15:20	50.0			
07/23/1996 16:00	59.0			
08/20/1996 15:15	85.0			
09/24/1996 15:20	56.0			
10/22/1996 15:00	49.0			
11/19/1996 15:40	58.0			
12/10/1996 15:50	41.0			
02/18/1997 16:25	38.2			
03/18/1997 15:55	61.5			
04/22/1997 16:00	64.9			
05/28/1997 16:30	56.0			
06/24/1997 16:05	60.1			
07/15/1997 16:00	76.2			
08/19/1997 15:45	67.7			
09/23/1997 15:35	60.7			
10/21/1997 15:30	70.2			
11/18/1997 15:45	57.9			
12/10/1997 16:00	70.8			
01/21/1998 16:15	44.3			
03/17/1998 15:55	42.3			
04/21/1998 15:45	33.9			
05/19/1998 15:45	46.3			
06/23/1998 16:15	62.5			
07/21/1998 16:00	81.4			
08/18/1998 15:55	71.0			
09/22/1998 18:00	87.8			
10/20/1998 16:50	134.0			
11/18/1998 15:45	83.0			
12/15/1998 16:00	76.0			
01/19/1999 15:45	78.0			
02/23/1999 15:30	60.0			
03/23/1999 16:00	48.0			
04/20/1999 17:00	68.0			
05/20/1999 15:45	62.0			
06/22/1999 15:40	62.7			
07/20/1999 16:45	85.8			

Collection Date	Hardness	Temp Celcius	Field Ph	Do Probe
08/17/1999 16:35	96.5			
09/21/1999 16:45	36.5			
10/28/1999 15:35	70.6			
12/21/1999 15:40	51.6			
01/18/2000 16:35	63.9			
02/23/2000 14:35	51.0			
04/24/2000 16:15	39.0			
05/23/2000 17:55	54.0			
06/20/2000 16:55	60.1			
07/18/2000 17:05	78.0			
08/22/2000 15:50	65.2			
10/24/2000 15:50	81.5			
11/28/2000 17:00	104.0			
1/23/2001	53.4			
1/23/2001		2.68	7.05	13.77
1/23/2001		2.66		13.76
1/23/2001		2.64	7.05	13.73
2/20/2001	54.0	8.90	7.75	11.58
2/20/2001		8.54		11.56
2/20/2001		8.26		11.67
2/20/2001		8.21	7.69	11.63
3/27/2001	30.3	9.46	7.08	12.32
3/27/2001		9.39		12.33
3/27/2001		9.34		12.45
3/27/2001		9.34		12.47
3/27/2001		9.31	7.08	12.73
4/24/2001	48.0	21.47	8.60	9.04
4/24/2001		21.04		8.57
4/24/2001		20.65		7.89
4/24/2001		20.69	6.77	6.50
6/19/2001	52.8	28.56	8.53	8.40
6/19/2001		27.98		8.08
6/19/2001		27.28		7.84
6/19/2001		27.11		7.65
6/19/2001		27.07	7.49	7.55
7/24/2001	44.9	28.20	7.79	7.78
7/24/2001		27.62	7.57	7.09
7/24/2001		27.53	7.44	7.06
7/24/2001		27.47	7.37	6.80
8/21/2001	59.5	28.78	7.70	6.46
8/21/2001		28.69		6.38
8/21/2001		28.64		6.66
8/21/2001		28.67		6.47
8/21/2001		28.61	7.64	6.81
9/18/2001	55.7	24.35	8.32	8.18
9/18/2001		23.46		6.89
9/18/2001		23.24		6.94
9/18/2001		22.96		7.09
9/18/2001		22.80	7.95	7.22
10/16/2001	120.0	19.51	7.92	9.12
10/16/2001		19.38		8.86
10/16/2001		19.37		8.88
10/16/2001		19.35		8.75
10/16/2001		19.33	7.82	8.82
11/27/2001	52.7	12.42	7.79	10.22
11/27/2001		11.77		10.41
11/27/2001		11.68		10.56
11/27/2001		11.67		10.63
11/27/2001		11.69	7.75	10.84
12/12/2001	109.0	11.83	7.60	10.09
12/12/2001		11.79		10.16
12/12/2001		11.72		10.20
12/12/2001		11.72		10.32

Collection Date	Hardness	Temp Celcius	Field Ph	Do Probe
12/12/2001		11.34	7.54	10.55
1/22/2002	85.0	5.69	7.61	12.63
1/22/2002		5.65		12.78
1/22/2002		5.63		12.94
1/22/2002		5.60	7.45	13.29
2/19/2002	44.1	8.13	7.78	11.51
2/19/2002		7.75		11.22
2/19/2002		7.23		11.36
2/19/2002		7.23	7.66	12.21
3/19/2002	56.5	12.80	7.75	9.05
3/19/2002		12.80		9.11
3/19/2002		12.74		8.97
3/19/2002		12.76		9.14
3/19/2002		12.69	7.67	9.26
4/16/2002		23.50	7.58	7.66
4/16/2002		22.69		7.72
4/16/2002		22.30		7.73
4/16/2002		21.87	7.45	7.77
5/30/2002	66.4	27.12	7.63	6.67
5/30/2002		26.51	7.55	6.43
5/30/2002		26.36	7.53	6.47
5/30/2002		26.20	7.53	6.33
5/30/2002		26.18	7.54	6.21
6/25/2002	100.0	28.64	7.63	
6/25/2002		28.57	7.64	
6/25/2002		28.49	7.52	
6/25/2002		28.46	7.53	
6/25/2002		28.40	7.48	
7/23/2002	114.0	30.30	7.57	6.25
7/23/2002		30.06	7.49	5.85
7/23/2002		29.98	7.48	5.77
7/23/2002		29.95	5.74	7.48
7/23/2002		29.96	7.48	5.75
8/13/2002	118.0	29.05	8.29	9.39
8/13/2002		28.18	7.95	8.18
8/13/2002		28.18	7.78	7.53
8/13/2002		28.03	7.72	7.34
9/24/2002	107.0	26.16	7.75	8.39
9/24/2002		26.08	7.41	7.52
9/24/2002		25.85	7.41	7.07
9/24/2002		25.76	7.38	6.90
9/24/2002		25.71	7.36	6.89
10/22/2002	128.0	16.56	7.93	8.32
10/22/2002		16.48	7.92	8.12
10/22/2002		16.38	7.91	8.17
10/22/2002		16.37	7.92	8.20
10/22/2002		16.27	7.92	8.45
11/19/2002	32.3	10.23	7.13	12.19
11/19/2002		10.23	7.12	11.93
11/19/2002		10.23	7.13	11.95
11/19/2002		10.22	7.12	12.08
11/19/2002		10.23	7.13	12.32
12/10/2002	66.8	2.45	7.60	14.31
12/10/2002		2.46	7.59	14.59
12/10/2002		2.45	7.58	14.53
12/10/2002		2.46	7.57	15.66
1/21/2003	56.3	2.20	7.65	14.47
1/21/2003		2.20	7.62	14.45
1/21/2003		2.20	7.60	14.68
1/21/2003		2.20	7.60	14.76
1/21/2003		2.19	7.56	15.05
2/25/2003	46.7	4.62	7.01	13.04
2/25/2003		4.61	6.96	13.05

Collection Date	Hardness	Temp Celcius	Field Ph	Do Probe
2/25/2003		4.60	6.93	13.13
2/25/2003		4.60	6.93	13.31
2/25/2003		4.61	6.89	13.37
2/25/2003		4.61	6.93	13.53
3/18/2003	54.3	11.57	7.72	10.48
3/18/2003		11.50	7.71	10.49
3/18/2003		11.40	7.69	10.68
3/18/2003		11.32	7.69	10.40
3/18/2003		11.29	7.71	10.63
5/27/2003	34.6	17.19	6.80	9.44
5/27/2003		17.17	6.86	9.46
5/27/2003		17.17	6.85	9.52
5/27/2003		17.17	6.88	9.52
5/27/2003		17.17	6.89	9.28
6/24/2003	49.2	21.53	7.68	8.70
6/24/2003		21.40	7.68	8.70
6/24/2003		21.38	7.67	8.75
6/24/2003		21.40	7.66	8.79
6/24/2003		21.41	7.67	8.87
7/15/2003	50.0	26.69	7.69	8.06
7/15/2003		26.57	7.63	8.02
7/15/2003		26.44	7.58	7.84
7/15/2003		26.41	7.56	7.79
7/15/2003		26.41	7.56	7.93
8/26/2003	56.2	29.41	8.38	7.82
8/26/2003		28.86	8.26	7.64
8/26/2003			70.4	
8/26/2003		28.35	8.15	7.62
8/26/2003		27.96	8.20	7.77
8/26/2003		27.64	8.01	7.58
9/24/2003	22.8	21.03	7.45	12.18
9/24/2003		21.03	7.45	12.18
9/24/2003		21.03	7.44	12.20
9/24/2003		21.01	7.43	12.18
10/28/2003	48.0	15.06	7.63	9.41
10/28/2003		15.07	7.63	9.46
10/28/2003		15.08	7.63	9.37
10/28/2003		15.06	7.62	9.65
10/28/2003		15.06	7.61	9.98
11/18/2003		10.47	7.57	10.33
11/18/2003		10.46	7.50	10.32
11/18/2003		10.45	7.54	10.32
11/18/2003		10.45	7.52	10.38
11/18/2003		10.45	7.52	10.49
12/16/2003	40.0	4.36	7.34	12.57
12/16/2003		4.34	7.30	12.69
12/16/2003		4.33	7.29	12.53
12/16/2003		4.34	7.25	12.38
12/16/2003		4.36	7.25	12.49
2/25/2004	63.5	6.35	7.78	12.55
2/25/2004		6.33	7.77	12.59
2/25/2004		6.34	7.75	12.76
2/25/2004		6.38	7.74	12.81
2/25/2004		6.32	7.71	12.64
3/23/2004	53.4	10.45	7.73	11.30
3/23/2004		10.32	7.75	11.27
3/23/2004		10.26	7.75	11.36
3/23/2004		10.28	7.73	11.44
4/20/2004		17.61	7.42	9.45
4/20/2004		17.53	7.39	9.49
4/20/2004		17.53	7.38	9.49
4/20/2004		17.52	7.36	9.51
4/20/2004		17.55	7.38	9.68

Collection Date	Hardness	Temp Celcius	Field Ph	Do Probe
5/18/2004	58.0		8.07	
5/18/2004			7.73	
5/18/2004			7.58	
5/18/2004			7.62	
6/15/2004	48.0	25.31	7.41	7.60
6/15/2004		24.62	7.39	7.64
6/15/2004		24.58	7.40	7.63
6/15/2004		24.46	7.39	7.63
6/15/2004		24.46	7.40	7.55
7/20/2004	62.7	28.63	8.38	7.32
7/20/2004		28.49	8.30	6.96
7/20/2004		28.35	8.27	7.13
7/20/2004		28.12	8.19	7.40
7/20/2004		28.20	8.21	7.07
8/17/2004	58.6	25.00	7.51	6.80
8/17/2004		24.60	7.52	6.73
8/17/2004		24.30	7.50	7.02
8/17/2004		24.10	7.44	7.14
8/17/2004		24.20	7.45	7.07
9/21/2004	63.1	20.73	7.71	8.65
9/21/2004		20.55	7.71	8.62
9/21/2004		20.51	7.70	8.59
9/21/2004		20.52	7.71	8.71
9/21/2004		20.52	7.78	8.63
10/19/2004	34.0	15.89	7.93	9.26
10/19/2004		15.87	7.89	9.29
10/19/2004		15.80	7.83	9.38
10/19/2004		15.77	7.82	9.40
10/19/2004		15.76	7.86	9.44
11/16/2004	44.0	9.25	7.54	11.34
11/16/2004		9.23	7.56	11.28
11/16/2004		9.23	7.52	11.40
11/16/2004		9.21	7.50	11.37
11/16/2004		9.20	7.54	11.40
12/14/2004	50.0	8.11	7.75	11.53
12/14/2004		8.14	7.76	11.60
12/14/2004		8.13	7.71	11.61
12/14/2004		8.16	7.69	11.65
12/14/2004		8.14	7.79	11.64
1/26/2005	56.0	.68	7.67	13.88
1/26/2005		.68	7.67	13.89
1/26/2005		.68	7.67	13.92
1/26/2005		.70	7.70	13.99
1/26/2005		.70	7.77	14.15
2/15/2005	70.0	7.26	7.74	11.62
2/15/2005		7.25	7.75	11.70
2/15/2005		7.25	7.73	11.68
2/15/2005		7.26	7.75	11.74
2/15/2005		7.20	7.79	12.00
3/22/2005	56.0	10.57	7.72	10.99
3/22/2005		10.34	7.71	10.95
3/22/2005		10.31	7.71	10.90
3/22/2005		10.31	7.73	10.81
3/22/2005		10.31	7.76	10.87
4/19/2005	58.2	16.30	7.60	9.18
4/19/2005		16.30	7.58	9.20
4/19/2005		16.20	7.60	9.33
4/19/2005		16.20	7.60	9.30
4/19/2005		16.20	7.62	9.26
5/24/2005	44.0	20.00	7.45	7.94
5/24/2005		19.99	7.42	8.00
5/24/2005		19.98	7.41	7.98
5/24/2005		19.99	7.52	8.07

Collection Date	Hardness	Temp Celcius	Field Ph	Do Probe
5/24/2005		19.99	7.60	8.12
6/21/2005	80.0	26.90	7.81	7.55
6/21/2005		25.90	7.68	7.34
6/21/2005		25.50	7.55	7.22
6/21/2005		25.10	7.44	7.22
6/21/2005		25.00	7.48	7.24
7/19/2005	64.0	33.12	7.86	7.24
7/19/2005		31.26	7.54	6.67
7/19/2005		30.81	7.43	6.61
7/19/2005		30.82	7.45	6.63
7/19/2005		30.82	7.47	6.57
8/23/2005	68.0	29.80	7.70	6.66
8/23/2005		29.70	7.68	6.62
8/23/2005		29.60	7.70	6.66
8/23/2005		29.60	7.64	6.61
8/23/2005		29.60	7.62	6.60
9/20/2005	110.0	28.10	7.90	7.06
9/20/2005		27.90	7.82	6.83
9/20/2005		27.90	7.78	6.83
9/20/2005		27.90	7.77	6.80
10/18/2005	56.0	18.90	7.72	8.76
10/18/2005		18.80	7.66	8.25
10/18/2005		18.80	7.31	6.04
10/18/2005		18.80	7.30	5.49
11/15/2005			7.77	9.78
11/15/2005	102.0	14.60	7.77	9.78

Collection Date	Hardness	Temp Celcius	Field Ph	Do Probe
11/15/2005		14.50	7.76	9.75
11/15/2005		14.38	7.78	9.80
11/15/2005		14.20	7.81	9.76
11/15/2005		14.30	7.88	9.78
12/13/2005		3.85	7.17	12.93
12/21/2005	52.0	2.90	7.56	13.36
12/21/2005		2.90	7.55	13.35
12/21/2005		2.90	7.54	13.29
12/21/2005		2.90	7.52	13.34
12/21/2005		2.80	7.49	13.56
1/17/2006	76.0	5.90	7.54	12.57
1/17/2006		5.90	7.52	12.59
1/17/2006		5.80	7.39	12.61
1/17/2006		5.80	7.32	12.54
1/17/2006		5.80	7.33	12.79
2/21/2006	55.0	6.00	7.21	12.40
2/21/2006		6.03	7.10	12.44
2/21/2006		6.32	7.20	12.43
2/21/2006		6.21	7.10	12.50
2/21/2006		6.10	7.11	12.61
3/20/2006	64.0	12.90	8.10	10.20
3/20/2006		12.90	8.10	10.20
3/20/2006		12.80	8.10	10.30
3/20/2006		12.60	8.00	10.30
4/26/2006	51.0	19.90	7.60	8.00
4/26/2006		19.80	7.60	8.10
4/26/2006		19.80	7.60	8.00
4/26/2006		19.80	7.60	8.10
4/26/2006		19.80	7.60	8.10
5/15/2006	54.0	20.60	7.60	7.70
5/15/2006		20.00	7.60	7.70
5/15/2006		19.90	7.60	7.70
5/15/2006		19.90	7.60	7.60
5/15/2006		19.90	7.60	7.60
6/21/2006		28.40	7.80	7.00
7/24/2006	90.0	29.80	7.90	6.90
7/24/2006		29.20	7.90	6.80
7/24/2006		28.60	7.60	6.40
7/24/2006		28.50	7.60	6.40
7/24/2006		28.40	7.60	6.40
8/22/2006	106.0	28.80	7.90	7.30
8/22/2006		28.80	7.90	7.30
8/22/2006		28.80	7.90	7.30
8/22/2006		28.80	7.90	7.20
8/22/2006		28.80	7.80	7.00
9/27/2006		22.50	8.10	8.70
10/30/2006	52.0	12.20	7.50	10.20
10/30/2006		12.10	7.50	10.20
10/30/2006		12.10	7.50	10.30
10/30/2006		12.10	7.50	10.40
11/15/2006	38.0	12.70	7.40	9.80
11/15/2006		12.70	7.40	9.80
11/15/2006		12.70	7.40	9.90
11/15/2006		12.70	7.40	9.80
11/15/2006		12.70	7.40	10.00
12/18/2006		8.10	7.30	12.00
01/24/2007 15:15	56.0			
90th%	**106.8**	**28.6**	**7.9**	**12.8**
10th%	**40.8**	**4.6**	**7.3**	**6.8**
Average	**63.6**	**16.8**	**7.8**	**9.6**

Average Ambient Upstream Temperature (James River Station 2-JMS104.16) in degrees Celcius

January	February	March	April	May	June	July	August	September	October	November	December
2.68	8.90	9.46	21.47	27.12	28.56	28.20	28.78	24.35	19.51	12.42	11.83
2.66	8.54	9.39	21.04	26.51	27.98	27.62	28.69	23.46	19.38	11.77	11.79
2.64	8.26	9.34	20.65	26.36	27.28	27.53	28.64	23.24	19.37	11.68	11.72
5.69	8.21	9.34	20.69	26.20	27.11	27.47	28.67	22.96	19.35	11.67	11.72
5.65	8.13	9.31	23.50	26.18	27.07	30.30	28.61	22.80	19.33	11.69	11.34
5.63	7.75	12.80	22.69	17.19	28.64	30.06	29.05	26.16	16.56	10.23	2.45
5.60	7.23	12.80	22.30	17.17	28.57	29.98	28.18	26.08	16.48	10.23	2.46
2.20	7.23	12.74	21.87	17.17	28.49	29.95	28.18	25.85	16.38	10.23	2.45
2.20	4.62	12.76	17.61	17.17	28.46	29.96	28.03	25.76	16.37	10.22	2.46
2.20	4.61	12.69	17.53	17.17	28.40	26.69	29.41	25.71	16.27	10.23	4.36
2.20	4.60	11.57	17.53	20.00	21.53	26.57	28.86	21.03	15.06	10.47	4.34
2.19	4.60	11.50	17.52	19.99	21.40	26.44	28.35	21.03	15.07	10.46	4.33
.68	4.61	11.40	17.55	19.98	21.38	26.41	27.96	21.03	15.08	10.45	4.34
.68	4.61	11.32	16.30	19.99	21.40	26.41	27.64	21.01	15.06	10.45	4.36
.68	6.35	11.29	16.30	19.99	21.41	28.63	25.00	20.73	15.06	10.45	8.11
.70	6.33	10.45	16.20	20.60	25.31	28.49	24.60	20.55	15.89	9.25	8.14
.70	6.34	10.32	16.20	20.00	24.62	28.35	24.30	20.51	15.87	9.23	8.13
5.90	6.38	10.26	16.20	19.90	24.58	28.12	24.10	20.52	15.80	9.23	8.16
5.90	6.32	10.28	19.90	19.90	24.46	28.20	24.20	20.52	15.77	9.21	8.14
5.80	7.26	10.57	19.80	19.90	24.46	33.12	29.80	28.10	15.76	9.20	8.10
5.80	7.25	10.34	19.80		26.90	31.26	29.70	27.90	18.90	14.60	2.90
5.80	7.25	10.31	19.80		25.90	30.81	29.60	27.90	18.80	14.50	2.90
	7.26	10.31	19.80		25.50	30.82	29.60	27.90	18.80	14.38	2.90
	7.20	10.31			25.10	30.82	29.60	22.50	18.80	14.20	2.90
	6.00	12.90			25.00	29.80	28.80		12.20	14.30	2.80
	6.03	12.90			28.40	29.20	28.80		12.10	12.70	8.10
	6.32	12.80				28.60	28.80		12.10	12.70	
	6.21	12.60				28.50	28.80		12.10	12.70	
	6.10					28.40	28.80			12.70	
										12.70	
3.37	**6.57**	**11.15**	**19.23**	**20.92**	**25.69**	**28.85**	**28.05**	**23.65**	**16.33**	**11.48**	**6.20**

Ambient Data from Station ID 2-GOD000.77

Collection Date	Temp Celcius °C	Field Ph S.U.	Do Probe mg/L	Hardness mg/L as $CaCO_3$
8/6/1997	22.91	7.22	8.00	39.5
10/27/1997	14.60	6.96	8.72	31.2
12/23/1997	8.73	6.94	11.51	35.3
2/18/1998	11.62	6.91	10.55	43.4
4/30/1998	16.63	7.71	11.74	44.7
6/11/1998	19.00	7.06	8.61	34.7
8/12/1998	25.80	7.09	7.82	34.6
10/14/1998	17.61	7.35	9.84	70.0
12/7/1998	17.88	7.06	9.76	57.0
2/10/1999	10.70	6.62	9.02	62.0
4/1/1999	13.66	7.27	9.53	68.0
6/30/1999	23.00	6.95	8.04	24.1
8/10/1999	24.17	7.58	9.45	57.1
10/25/1999	11.97	6.97	9.64	
12/27/1999				59.4
2/15/2000	9.38	6.78	11.16	52.0
4/11/2000	14.85	6.33	9.70	40.0
6/13/2000	24.36	7.00	6.04	46.4
8/1/2000	24.86	6.95	8.05	29.1
10/5/2000	21.30	7.32	8.94	57.0
12/20/2000	4.08	7.23	12.00	49.3
2/21/2001	11.29	6.96	9.31	48.0
4/18/2001	11.43	6.92	10.52	21.4
6/21/2005	18.26	7.19	8.17	60.0
7/19/2005	28.50		7.41	
8/15/2005	25.66	7.22	8.21	48.0
8/23/2005	23.45	7.81	7.41	
9/20/2005	26.11	7.74	9.24	
10/13/2005	17.30	6.20	8.16	48.0
10/18/2005	16.71	7.30		
11/15/2005	17.39	7.33	7.73	
12/13/2005	5.43	7.13	11.85	
12/20/2005	2.99	7.37	13.33	55.0
1/10/2006	10.42	7.00	11.65	
2/8/2006	7.46	7.05	11.89	
2/15/2006	4.87	6.93	12.67	50.0
3/29/2006	12.60	8.80		52.0
4/25/2006	18.10	7.00	8.50	
4/27/2006	16.00	7.10	6.50	
5/16/2006	15.80	7.00	8.60	
6/7/2006	20.00	7.10	7.90	

Ambient Data from Station ID 2-GOD000.77

Collection Date	Temp Celcius °C	Field Ph S.U.	Do Probe mg/L	Hardness mg/L as $CaCO_3$
7/24/2006	25.20	7.00	7.90	
8/29/2006	25.30	7.10	6.80	
9/25/2006	20.70	7.00	7.80	
10/31/2006	14.40	7.00	9.90	
11/28/2006	9.90	7.10	11.20	
12/6/2006	5.20	6.70	12.70	
1/24/2007	6.60	7.10	12.50	
2/14/2007	4.50	6.50	13.20	
3/19/2007	7.40	7.00	11.30	
6/4/2007	21.40	6.50	7.90	
6/12/2007	22.90	7.20	8.20	
90th%	**25.20**	**7.39**	**12.10**	**60.6**
10th%	**5.43**	**6.69**	**7.67**	**30.6**
Average	**15.89**	**7.09**	**9.52**	**47.0**

Attachment D

Site Visit Report and Notes

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Wastewater Facility Inspection Report

Facility Name:	DuPont – Spruance Plant	**Facility No.:**	VA0004669 (E4 Facility)
City/County:	Chesterfield	**Inspection Agency:**	DEQ
Inspection Date:	September 25, 2007 (0835-1300)	**Date Form Completed:**	November 6, 2007
Inspector:	Heather A. Horne	**Time Spent:**	40 hrs.
		Unannounced Insp.:	No

Reviewed By:

Present at Inspection: Waverly Smith and Kevlar Solvent Recovery division (Wayne Hamrick, Lee Williams, Joe Dorton, and Walter Barksdale)

TYPE OF FACILITY:

Domestic		Industrial	
[ ] Federal	[ ] Major	[x] Major	[ ] Primary
[ ] Non-Federal	[ ] Minor	[ ] Minor	[ ] Secondary

Population Served: N/A domestic wastewater from site is treated by the County WWTF

Number of Connections: N/A

TYPE OF INSPECTION:

[x] Routine — Date of last inspection: 9/26/06

[ ] Compliance — Agency: DEQ/PRO

[ ] Reinspection

EFFLUENT MONITORING: **Refer to DMR files for Effluent Monitoring Data for multiple outfalls**

Last month: CBOD: ____ mg/L Ammonia: ____ mg/L Flow:_____ MGD

(Effluent) Date:

Other:

Quarter average: CBOD: ____ mg/L Ammonia: ___ mg/L Flow: _____ MGD

(Effluent) Date:

Other:

CHANGES AND/OR CONSTRUCTION

DATA VERIFIED IN PREFACE	[ ] Updated	[x] No changes
Has there been any new construction?	[ ] Yes*	[x] No
If yes, were plans and specifications approved?	[ ] Yes	[ ] No* [x] N/A
DEQ approval date:	N/A	

(A) PLANT OPERATION AND MAINTENANCE

1. Class and number of licensed operators: Class I – 4; Class II - 1; Class III - 1, Class IV – 4 (OMI operators)
2. Hours per day plant is staffed: 24 hours/day
3. Describe adequacy of staffing: [x] Good [ ] Average [ ] Poor*
4. Does the plant have an established program for training personnel? [x] Yes [ ] No
5. Describe the adequacy of the training program: [x] Good [ ] Average [ ] Poor*
6. Are preventive maintenance tasks scheduled? [x] Yes [ ] No*
7. Describe the adequacy of maintenance: [x] Good [ ] Average [ ] Poor*
8. Does the plant experience any organic/hydraulic overloading? [ ] Yes* [x] No

   If yes, identify cause and impact on plant: N/A
9. Any bypassing since last inspection? [ ] Yes* [x] No
10. Is the on-site electric generator operational? [x] Yes [ ] No* [ ] N/A
11. Is the WWTP alarm system operational? [x] Yes [ ] No * [ ] N/A
12. How often is the standby generator exercised? [ ] Weekly [ ] Monthly [x] Other: as needed

    Power Transfer Switch? [ ] Weekly [ ] Monthly [x] Other: N/A

    Alarm System? [x] Weekly [x] Monthly [ ] Other:
13. When were the cross connection control devices last tested on the potable water service? Main supply connection with the County of Chesterfield. There are fourteen-cross-connection control devices associated with the potable water supply (internal to the plant); these devices are checked routinely by certified staff. Mailed certification to Chesterfield County on the date conducted 5/3/07.
14. Is sludge disposed in accordance with the approved sludge disposal plan? [ ] Yes [ ] No* [x] N/A
15. Is septage received by the facility? [ ] Yes [x] No

    Is septage loading controlled? [ ] Yes [ ] No * [x] N/A

    Are records maintained? [ ] Yes [ ] No* [x] N/A
16. Overall appearance of facility: [x] Good [ ] Average [ ] Poor*

Comments: OMI (contract operator) staff is responsible for operation and maintenance of wastewater and ground water treatment facilities. #3 Calibration of instruments is conducted and maintained by Mr. George Talley of OMI. #4 Correspondence courses and on-site cross training. OMI has corporate programs for management advancement training and a training-needs assessment program. Training also addressed in performance expectations and job descriptions. #6 Preventative Maintenance (PM) tasks are assigned weekly to appropriate staff; staff use "Maintenance Management System" software. #8 Permittee manages loading from production processes by issuing "non-routine discharge permits." #9 Any incidents are documented by permittee in correspondences to DEQ permit writer.
#10 Alternate power feed for the lime tower. A portable generator is maintained. #11 Alarms associated with the domestic wastewater pump stations are tested weekly. Facility maintains alarms for high TOC conc. (75 ppm) at the Lime Tower discharge and on continuous monitoring equipment at VPDES Outfall 001. #14 A Sludge Management Plan/SDP is included in the O & M Manual. Solids from the WTP are disposed at Shoosmith Landfill in accordance with "Plans" provided to this office. Solids from the Aerated Lagoons (Outfall 101) and the Polishing Pond are removed and properly disposed in accordance with plans provided to this office on a case-by-case basis.

(B) PLANT RECORDS

1. Which of the following records does the plant maintain?

Operational Logs for each unit process	[x] Yes	[ ] No*	[ ] N/A
Instrument maintenance and calibration	[x] Yes	[ ] No*	[ ] N/A
Mechanical equipment maintenance	[x] Yes	[ ] No*	[ ] N/A
Industrial waste contribution **(Municipal Facilities)**	[ ] Yes	[ ] No*	[x] N/A

2. What does the operational log contain?

Visual Observations	[x] Yes	[ ] No	[ ] N/A
Flow Measurement	[x] Yes	[ ] No	[ ] N/A
Laboratory Results	[x] Yes	[ ] No	[ ] N/A
Process Adjustments	[x] Yes	[ ] No*	[ ] N/A
Control Calculations	[x] Yes	[ ] No	[ ] N/A
Other:			

3. What do the mechanical equipment records contain:

As built plans and specs?	[x] Yes	[ ] No*	[ ] N/A
Spare parts inventory?	[x] Yes	[ ] No*	[ ] N/A
Manufacturers instructions?	[x] Yes	[ ] No*	[ ] N/A
Equipment/parts suppliers?	[x] Yes	[ ] No*	[ ] N/A
Lubrication schedules?	[x] Yes	[ ] No*	[ ] N/A
Other:			
Comments:	None		

4. What do the industrial waste contribution records contain: ***(Applicable to municipal facilities only)***

Waste characteristics?	[ ] Yes	[ ] No*	[x] N/A
Locations and discharge types?	[ ] Yes	[ ] No*	[x] N/A
Impact on plant?	[ ] Yes	[ ] No*	[x] N/A
Other:	N/A		
Comments:	None		

5. Are the following records maintained at the plant:

Equipment maintenance records	[x] Yes	[ ] No*	[ ] N/A
Operational Log	[x] Yes	[ ] No*	[ ] N/A
Industrial contributor records	[ ] Yes	[ ] No*	[x] N/A
Instrumentation records	[x] Yes	[ ] No*	[ ] N/A
Sampling and testing records	[x] Yes	[ ] No*	[ ] N/A

6. Are records maintained at a different location? [ ] Yes [x] No
   Where are the records maintained? OMI maintains all records on site.

7. Were the records reviewed during the inspection [x] Yes [ ] No

8. Are the records adequate and the O & M Manual current? [x] Yes [ ] No* [ ] N/A
   O&M Manual date written: Lastest revision is June 2006
   DEQ approved O&M: August 12, 2002

9. Are the records maintained for required 3-year period? [x] Yes [ ] No*

Comments: OMI staff provides comprehensive monthly status reports to the DuPont staff. The main operations log includes daily entries by the lead-shift operators and maintenance documentation. Individual logs are also maintained at the alum lime tower, ground water facilities, and the operations office. Permittee has developed written standard operating procedures. #8: The O&M manual is updated annually. The next scheduled update is by the end of 2007.

(C) SAMPLING

1.	Are sampling locations capable of providing representative samples?	[x] Yes	[ ] No*	[ ] N/A
2.	Do sample types correspond to those required by the permit?	[x] Yes	[ ] No*	[ ] N/A
3.	Do sampling frequencies correspond to those required by the permit?	[x] Yes	[ ] No*	[ ] N/A
4.	Are composite samples collected in proportion to flow?	[x] Yes	[ ] No*	[ ] N/A
5.	Are composite samples refrigerated during collection?	[x] Yes	[ ] No*	[ ] N/A
6.	Does plant maintain required records of sampling?	[x] Yes	[ ] No*	[ ] N/A
7.	Does plant run operational control tests?	[x] Yes	[ ] No*	[ ] N/A

Comments: None.

(D) TESTING

1. Who performs the testing?

[x] Plant/ Lab

[ ] Central Lab

[x] Commercial Lab - Name: Toxics monitoring analyzed by ProChem (formerly Olver Corp.), annual groundwater samples are analyzed by Severn Trent; all other VPDES parameters not analyzed on site are analyzed by Microbac.

If plant performs any testing, complete 2-4.

2. What method is used for chlorine analysis? HACH DR-3000

3.	Is sufficient equipment available to perform required tests?	[x] Yes	[ ] No*	[ ] N/A
4.	Does testing equipment appear to be clean and/or operable?	[x] Yes	[ ] No*	[ ] N/A

Comments: Please see the DEQ *Laboratory Inspection Report* for the laboratory inspection. The laboratory inspection was conducted by Meredith Williams, DEQ (concurrently to this technical inspection).

(E) FOR INDUSTRIAL FACILITIES W/ TECHNOLOGY BASED LIMITS

1. Is the production process as described in the permit application? (If no, describe changes in comments)

   [x] Yes [ ] No* [ ] N/A

2. Do products and production rates correspond to the permit application? (If no, list differences in comments section)

   [x] Yes [ ] No* [ ] N/A

3. Has the State been notified of the changes and their impact on plant effluent?

   [x] Yes [ ] No* [ ] N/A

Comments: DuPont staff routinely provides information about production changes to this office. Periodic chemical input changes are made. **DuPont plans to increase Kevlar production in the near future. The facility reported plans were submitted to their permit writer, Ray Jenkins, that reflected they will be able to meet current VPDES permit limits even with the increased production.**

FOLLOW UP TO COMPLIANCE RECOMMENDATIONS FROM THE SEPTEMBER 26, 2006 DEQ INSPECTION:

There were no compliance recommendations.

FOLLOW UP TO GENERAL RECOMMENDATIONS FROM THE SEPTEMBER 26, 2006 DEQ INSPECTION:
There were no compliance recommendations

INSPECTION REPORT SUMMARY

Compliance Recommendations/Request for Corrective Action:

There are no compliance recommendations.

General Recommendations/Observations:

1. Please continue to monitor and control the phragmites (common weed) established within the inlet and along the edges of the polishing pond.

2. Please be aware while considering the addition of polymer for phosphorus removal that the addition of polymer may impact both the amount and the characteristics of sludge at the bottom of the polishing pond. Please monitor the capacity of this pond carefully. The polymer addition may require a change to both your O & M manual and the Sludge Disposal Plan.

3. The facility appeared to be well operated and maintained. The DuPont and OMI staffs are very knowledgeable about environmental issues at this site and the regulatory requirements.

4. The inspector noted two discrepancies relating to the Weak Acid Storage Pond:
    - The SOP provided to the inspector indicates "The Weak Acid Storage Pond serves as a holding basin during pipeline outages to avoid curtailment of Spinning." However, it appears the pond is used as continuous storage.
    - The MSDS for weak sulfuric acid provided by the facility during the inspection does not adequately address accidental release measures. The MSDS indicates "Large spills are improbable because of package size." This is not applicable to the weak acid pond.

Comments:

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

[x] Yes	[ ] No		Operational Units
[ ] Yes	[x] No	[ ] N/A	O & M Manual (Most recent revision dated June 2006)
[ ] Yes	[x] No		Maintenance Records
[ ] Yes	[ ] No	[x] N/A	Pathogen Reduction & Vector Attraction Reduction
[ ] Yes	[x] No	[ ] N/A	Sludge Disposal Plan
[ ] Yes	[x] No	[ ] N/A	Groundwater Monitoring Plan
[ ] Yes	[x] No	[ ] N/A	Stormwater Pollution Prevention Plan (See stormwater inspection report)
[x] Yes	[ ] No	[ ] N/A	Permit Special Conditions
[x] Yes	[ ] No	[ ] N/A	Permit Water Quality Chemical Monitoring
[x] Yes	[ ] No	[ ] N/A	Laboratory Records (see Lab Report)

WATER/WASTEWATER SYSTEMS OVERVIEW:

Water Treatment Plant (Internal Outfall 102): Supply water from the "Reservoir" is treated and filtered so that it can be used in various production processes. The Alum Sludge Dewatering system includes vacuum suction of solids from the Settling Basins, solids pumping, (2) Holding Tanks, a Thickener, and polymer addition. Thickened solids are dewatered by centrifugation - solids are landfill disposed. Overflow from the Holding Tanks and Thickener is directed to the Settling Basins. Centrate is discharged to the wastewater treatment facility (VPDES Outfall No. 101). Discharges to VPDES Outfall No. 102 are composed of sand-filter back flush and water softener regeneration residues. Flow is estimated based on backwash cycle times. Samples are taken at the designated Outfall 102 manhole. The system was in good condition and was reported to be operational.

Ground Water Monitoring, Recovery and Treatment System (Internal Outfall 103): (RCRA and VPDES Permit) OMI maintains and operates the ground water recovery and treatment system, and performs monitoring under contract with DuPont. The ground water collection system is comprised of approximately 46 extraction wells. It varies as to how many are on line at a time. ~210 monitoring wells are maintained on and off site. Water from the extraction wells is pumped overland (hard pipe) to the ground water treatment plant, which is designed to remove organic solvents. The treatment plant is equipped with secondary containment. In case of spills, water could be sent to the wastewater treatment system for neutralization. Groundwater treatment units may be monitored (system overview) and controlled by computer (manual control is also available). The facilities appeared to be in good condition, and were reported to be operational. All wells are inspected at least annually.

Reservoir: The Reservoir receives raw water from the James River to be used for non-contact cooling and make up water for various production processes. Non-contact cooling water is discharged to the Reservoir to be cooled and reused. Water withdrawn from the Reservoir is routinely disinfected using 15% sodium hypochlorite solution. The Reservoir also receives a discharge from an Oil/Water Separator Unit maintained near the Power House. There was no sheen on the surface of the reservoir at the time of the inspection. The Oil/Water Separator was reported to be operational. The Reservoir is equipped with spray-headers, which are usually used for ambient cooling during the summer. The Reservoir is equipped with an overflow dam (discharges to VPDES Outfall 001), and an under drain, which continuously discharges to VPDES Outfall 001 via the "Exxon Ditch". Water was not discharging over the dam at the time of inspection.

Domestic Wastewater Pump Stations (not viewed during this inspection): In addition to the Main Pump Station described on the attached "Unit Process: Sewage Pumping" page, the Facility maintains numerous "satellite" pump stations. The satellite stations pump to either the North, or South Flow Metering Stations. The North Station that handles ~50% of overall flow and is a gravity-fed line to the County. The South (metering) Station, receiving ~50% of overall flow*, is a gravity fed sewer from the metering station to the County. All pump stations are equipped with local audio and visual alarm signals to indicate a high-liquid-level condition in the wet well. Continuous operability provisions include portable pump, back-up power, station shut down, and/or redirection of wastewater to another station. The alarms at the satellite pump stations are not equipped with alternate power. OMI maintains and operates all stations. A complete check of all stations is performed annually. All stations and alarm systems were reported to be operational. A complete list of the pump stations is maintained by the Permittee in their "Sanitary Sewer System Operation and Maintenance Plan". The permittee reported that all domestic wastewater stations maintained on site currently meet the requirements specified in writing by the Virginia Dept. of Health.
*Since the previous inspection a new flow meter was installed in the South Pump Station. Information previously provided by the facility indicated the South Station received 80% of the flow. The new flow meter appears to be measuring flow more accurately and indicates the South Station handles 50% of the flow.

Cooling Towers: The permittee maintains numerous cooling towers – (3) associated with Kevlar® and (3-4) associated with Nomex® production, (3) associated with onsite DuPont Teijin Film production (2) small towers associated with Tyvek and Zytel production. The cooling towers are treated with a common biocide and corrosion inhibitor. Cooling tower blow down is discharged to the Neutralization Basin(s) associated with Outfall 101.

Storm Water Pollution Prevention Plan (not viewed during this inspection): In accordance with the VPDES Permit, the facility maintains a Storm Water Pollution Prevention Plan. The Plan was reportedly complete, and up-to-date. DuPont conducts storm water sampling at storm water outfalls 002 & 003. There are eight storm water outfalls to Grindall Creek and one to the James River. Storm water ditches have been stabilized with riprap. Areas particularly susceptible to erosion have been graded and seeded. The facility has tagged all drop-drains on site to indicate receiving stream/final destination. Sluice gates have been installed at the end of some ditches. The permittee contains and treats some storm water prior to discharge through a permitted Outfall. Approximately 30+ acres of the manufacturing facility's roofs, dikes, and yard/road areas convey storm water through the Wastewater Treatment facility. An "Environmental Incident Program" has been established to quickly and efficiently respond to incidents ("Site Spill-Response Wagon") in which material(s) from process areas are released beyond established secondary containment/control structures. Additionally, sewers and subsurface chemical conveyance systems are continuously inspected and mapped (facility overview).

WATER/WASTEWATER SYSTEMS OVERVIEW (cont.):

Gypsum/Weak Acid Pond: The Facility maintains a 30-million gallon capacity Gypsum/Acid Pond which collects sulfuric acid from the Kevlar® fiber spinning process. The acid serves as an ingredient for gypsum production at DuPont's James River Site. Wastewater from the James River site activities is transported to the Spruance Plant wastewater treatment system (VPDES Outfall No. 101). The Pond is equipped with double synthetic Hypalon ® liners and a leachate collection system.
The inspector met with the Kevlar® Solvent Recovery Division in order to gather more information about the weak acid pond. Information provided by the facility is attached as an appendix to this report.

- The acid pond covers an area of 4.7 acres and is 24 feet deep (50 feet above sea level).
- The facility considers the sulfuric acid "weak" because it is ~8-10% acid when placed in the pond. The pH of this material is <2 S.U.
- The facility SOP indicates the maximum pond level is 49 feet above sea level or 30.45 MM gallons. Facility contacts indicated they usually operate the pond below 42 feet in order to prevent acid wind drift. A staff gauge is present for freeboard measurements.
- Although no fence is directly around the acid pond (the entire Spruance plant is secured by fencing), the facility installed jersey barriers to prevent vehicles or pedestrians from accidentally entering the pond.
- The SOP indicates "The Weak Acid Storage Pond serves as a holding basin during pipeline outages to avoid curtailment of Spinning." However, it appears the pond is used as continuous storage.
- Liner integrity testing was last conducted in ~2000 and showed no problems. Facility representatives indicated cleaning the bottom of the pond or checking for solids is not conducted because it would require shut down of the entire Kevlar process.
- A leachate collection underdrain is present for the pond. Leachate collected from the underdrain is pumped from the sump through three carbon filters and pumped back into the pond. The facility filters the leachate because the underdrain system has groundwater intrusion containing HMPA. The spent sulfuric acid stored in this pond is used to manufacture gypsum used in agriculture. HMPA is harmful to some crops, so leachate is filtered for HMPA removal before placing it back into the pond. The material pumped to James River is tested daily for HMPA.
- The entire system, including the pond sump drainage system and the carbon filter system, are reportedly patrolled twice per shift.
- The 904L stainless steel pipeline conveys acid from Spruance to the James River plant. A surge expansion tank protects the pipeline from a pressure surge.
- The MSDS for weak sulfuric acid provided by the facility during the inspection does not adequately address accidental release measures. The MSDS indicates "Large spills are improbable because of package size." This is not applicable to the weak acid pond.

UNIT PROCESS: Sewage Pumping

1. Name of station: Main Pump Station
2. Location (if not at STP): N/A
3. Following equipment operable:
   a. all pumps? [x] Yes [ ] No*
   b. ventilation? [x] Yes [ ] No* [ ] N/A
   c. control system? [x] Yes [ ] No* [ ] N/A
   d. sump pump? [ ] Yes [ ] No* [x] N/A
   e. seal water system? [ ] Yes [ ] No* [x] N/A

4. Reliability considerations:
   a. Class [x] I ***(modified)*** [ ] II [ ] III
   b. Alarm system operable? [x] Yes [ ] No [ ] N/A
   c. Alarm conditions monitored:
      1. high water level: [x] Yes [ ] No* [ ] N/A
      2. high liquid level in dry well: [ ] Yes [ ] No* [x] N/A
      3. main electric power: [ ] Yes [ ] No* [x] N/A
      4. auxiliary electric power: [ ] Yes [ ] No* [x] N/A
      5. failure of pump motors to start: [ ] Yes [ ] No* [x] N/A
      6. test function: [x] Yes [ ] No*
      7. other: N/A
   d. Backup for alarm system operational? [ ] Yes [ ] No* [x] N/A
   e. Alarm signal reported to (identify): local audio and visual alarm
   f. Continuous operability provisions:
      1. generator hook up? [ ] Yes [x] No
      2. two sources of electricity? [x] Yes [ ] No
      3. portable pump? [x] Yes [ ] No
      4. 1 day storage? [x] Yes [ ] No
      5. other:

5. Does station have bypass? [x] Yes* [ ] No
   a. evidence of bypass use? [ ] Yes* [x] No [ ] N/A
   b. can bypass be disinfected? [x] Yes [ ] No* [ ] N/A
   c. can bypass be measured? [x] Yes [ ] No* [ ] N/A

6. How often is station checked? Once per day

7. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: #4 & 5 Station equipped with 100,000–gallon capacity emergency overflow holding tank. All sewage goes to Chesterfield County wastewater system. The north pump station pumps 50% of sewage; the south pump station pumps 50% of the facility's sewage. For additional information see page six. Pumps stations were not viewed during this inspection.

UNIT PROCESS: Neutralization

VPDES Outfall No. 101

1. Type of unit: [x] In-line [ ] Side-line [ ] Spill Pond
   Number of units: 2 in series
   Number of units in operation: 2

2. What unit process does it precede? aerated lagoons

3. Is volume adequate? [x] Yes [ ] No

4. Type of mixing: [ ] None [ ] Diffused air [x] Fixed Mechanical [ ] Floating mechanical

5. Condition of mixing equipment: [x] Good [ ] Average [ ] Poor*

6. How drawn off?
   a. Pumped from: [ ] Surface [x] Sub-surface [ ] Adjustable [ ] N/A
   b. Weir: [ ] Surface [ ] Sub-surface [x] N/A

7. What is the condition of the containment structure? [x] Good [ ] Fair [ ] Poor*

8. Are the facilities to flush solids and grease from basin walls adequate? [x] Yes [ ] No* [ ] N/A

9. Are there facilities for withdrawing floating material and foam? [ ] Yes [x] No

10. How are solids removed? [x] Drain down [ ] Drag line [ ] Other:
    Is it adequate? [x] Yes [ ] No*

11. Is the emergency overflow in good condition? [ ] Yes [ ] No* [x] N/A

12. Are the depth gauges in good condition? [x] Yes [ ] No [ ] N/A

13. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Two neutralization basins, operated in series, each equipped with one mechanical mixer. Basins receive wastewater from four separate process sewers, including the East Road sewer, Mylar, Kevlar Solvent Recovery and the James River Gypsum plants. pH is altered in the basins with lime and/or caustic additions. The Basins discharge, via the flow-control structure (Outfall 106 pit), to the Aerated Lagoons. A lime slaker is present. Lime grit is removed and disposed at Shoosmith Landfill. Rinse water from grit lime slurry goes to the aerated lagoons. The TOC concentration of the discharge from the Basin is continuously monitored (alarm to auto-dial system). OMI is currently conducting a fixed film test in a trailer adjacent to the neutralization basins.

UNIT PROCESS: Aerated Lagoons

VPDES Outfall No. 101

1.	Type:	[x] Aerated	[ ] Unaerated	[ ] Polishing	
2.	No. of cells: Number in Operation:	2 (North and South) 2 (North and South)			
3.	Color:	[ ] Green [ ] Other	[x] D. Brown	[ ] L. Brown	[ ] Grey
4.	Odor:	[ ] Septic * [ ] Other:	[ ] Earthy	[x] None	
5.	System operated in:	[ ] Series	[x] Parallel	[ ] N/A	
6.	If aerated, are lagoon contents mixed adequately?	[x] Yes	[ ] No *	[ ] N/A	
7.	If aerated, is aeration system operating properly?	[x] Yes	[ ] No *	[ ] N/A	
8.	Evidence of following problems:				
	a. vegetation in lagoon or dikes?	[ ] Yes *	[x] No		
	b. rodents burrowing on dikes?	[ ] Yes *	[x] No		
	c. erosion?	[ ] Yes *	[x] No		
	d. sludge bars?	[ ] Yes *	[x] No		
	e. excessive foam?	[ ] Yes *	[x] No		
	f. floating material?	[x] Yes *	[ ] No		
9.	Fencing intact?	[x] Yes	[ ] No *		
10.	Grass maintained properly:	[x] Yes	[ ] No		
11.	Level control valves working properly?	[x] Yes	[ ] No *	[ ] N/A	
12.	Effluent discharge elevation:	[ ] Top	[ ] Middle	[x] Bottom **(and/or pumped)**	
13.	Available freeboard:	Approx. 8 ft.			
14.	Appearance of effluent:	[x] Good	[ ] Fair	[ ] Poor *	
15.	Are monitoring wells present?	[x] Yes	[ ] No		
	Are wells adequately protected from runoff?	[x] Yes	[ ] No *	[ ] N/A	
	Are caps on and secured?	[x] Yes	[ ] No *	[ ] N/A	
16.	General condition:	[x] Good	[ ] Fair	[ ] Poor*	

Comments: Two earthen (6-inch clay base) basins. The berm walls have been stabilized with asphalt. Structural integrity appeared to be good. Each basin is equipped with one withdrawal pump and four mechanical aerators and four mixers (target dissolved oxygen concentration is ~ 2 ppm). Wear plates are maintained below each mixer. #5 Lagoons may be operated in series if desired; however, they are usually operated in parallel. Each lagoon may be isolated if necessary. Sonar soundings are taken annually to check and map solids accumulation – solids are removed when capacity is reduced by ~30%. The next sonar sounding is scheduled for October 2007. The lagoons were last dredged in 2003. A dredge belt press was utilized to dewater solids. Water was pumped back to the neutralization basin and solids were landfilled. #8f Nomex ® and Kevlar ® fibrous solids, which accumulate on the surface of the lagoons, are periodically removed via a boat. Process control testing (composite and continuous in-line TOC) is performed at the flow-control station immediately preceding the Lagoons, and at the discharge from each Lagoon. The Lagoons discharge through a common pipeline to an open ditch, which flows to the inlet channel of the Polishing Pond. This ditch receives storm water from the waste compact area.

UNIT PROCESS: Sedimentation (Clarifiers)

VPDES Outfall No. 101

		[ ] Primary	[x] Secondary	[ ] Tertiary
1.	Number of units:		2	
	In operation:		0	
2.	Proper flow distribution between units?		[ ] Yes	[ ] No* [x] N/A
3.	Signs of short-circuiting and/or overloads?		[ ] Yes*	[x] No
4.	Effluent weirs level?		[ ] Yes	[ ] No* [x] N/A
	Clean?		[x] Yes	[ ] No*
5.	Scum collection system working properly?		[ ] Yes	[ ] No* [x] N/A
6.	Sludge collection system working properly?		[ ] Yes	[ ] No* [x] N/A
7.	Influent, effluent baffle systems working properly?		[ ] Yes	[ ] No* [x] N/A
8.	Chemical addition?		[ ] Yes	[x] No
	Chemicals:		N/A	
9.	Effluent characteristics:		N/A – units off line	
10.	General condition:		[ ] Good	[x] Fair [ ] Poor*

Comments: Units originally designed to receive process wastewater from the Aerated Lagoons. These units are currently maintained and used as emergency overflow units. If wastewater is diverted to these units, it would be returned to the Aerated Lagoons.

UNIT PROCESS: Ponds/Lagoons (Polishing Ponds)

Polishing Pond - VPDES Outfall No. 101

1.	Type:	[ ] Aerated	[ ] Unaerated	[x] Polishing	
2.	No. of cells: Number in Operation:	1 1			
3.	Color:	[x] Green [ ] Other	[ ] D. Brown	[ ] L. Brown	[ ] Grey
4.	Odor:	[ ] Septic * [ ] Other:	[ ] Earthy	[x] None	
5.	System operated in:	[ ] Series	[ ] Parallel	[x] N/A	
6.	If aerated, are lagoon contents mixed adequately?	[ ] Yes	[ ] No *	[x] N/A	
7.	If aerated, is aeration system operating properly?	[ ] Yes	[ ] No *	[x] N/A	
8.	Evidence of following problems:				
	a. vegetation in lagoon or dikes?	[x] Yes *	[ ] No		
	b. rodents burrowing on dikes?	[ ] Yes *	[x] No		
	c. erosion?	[ ] Yes *	[x] No		
	d. sludge bars?	[ ] Yes *	[x] No		
	e. excessive foam?	[ ] Yes *	[x] No		
	f. floating material?	[ ] Yes *	[x] No		
9.	Fencing intact?	[x] Yes	[ ] No *		
10.	Grass maintained properly:	[x] Yes	[ ] No		
11.	Level control valves working properly?	[x] Yes	[ ] No *	[ ] N/A	
12.	Effluent discharge elevation:	[x] Top	[ ] Middle	[ ] Bottom **(and/or pumped)**	
13.	Available freeboard:	Approx. 36 inches from low spot on berm; 16 inches for spillway			
14.	Appearance of effluent:	[x] Good	[ ] Fair	[ ] Poor *	
15.	Are monitoring wells present?	[x] Yes	[ ] No		
	Are wells adequately protected from runoff?	[x] Yes	[ ] No *	[ ] N/A	
	Are caps on and secured?	[x] Yes	[ ] No *	[ ] N/A	
16.	General condition:	[x] Good	[ ] Fair	[ ] Poor*	

Comments: A large earthen-lined pond that receives storm water, and process wastewater from the Aerated Lagoons. Pond discharges, VPDES Outfall 101, to VPDES Outfall 001. #8 Some vegetation along the berm in some areas. If the plant growth is not maintained, it may cause problems in the future. #11 A manually controlled discharge gate is used to control the lagoon level. Typically, the normal operating range for the Polishing Pond is maintained at 8 – 12 inches above a fixed referenced point ("0"). At the time of inspection, the pond was being operated at 12.75 inches above "0". A buffer strip of land separates the pond from the closed (circa 1978) landfill. HMPA, a solvent used in Kevlar manufacturing (discontinued in the 1980's), was detected in ground water and at low levels in pond sediments. Situation addressed by EPA Corrective Action Plan. HMPA is also a VPDES parameter at VPDES Outfall No. 101. Structural integrity of the Pond appeared to be good. Dam Safety Inspections are conducted for this Pond. The inlet channel to the pond was dredged and solids removed by a contractor in 2006. Polymer addition is being considered for the inlet channel to the polishing pond for phosphorus removal.

UNIT PROCESS: Flow Measurement

VPDES Outfall No. 101

1. Type measuring device: Drexelbrook Resistivity Tape w/ 48" Leopold Lagco Flume

2. Present reading: 4210 g.p.m.

3. Bypass channel? [ ] Yes [x] No

   Metered? [ ] Yes [ ] No* [x] N/A

4. Return flows discharged upstream from meter? [ ] Yes [x] No

   If Yes, identify: N/A

5. Device operating properly? [x] Yes [ ] No*

6. Date of last calibration: 09/04/07

7. Evidence of following problems:

   a. Obstructions? [ ] Yes* [x] No

   b. Grease? [ ] Yes* [x] No

8. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Flow data is hardwired to APECS (Automated Plant Environmental Control System). A hard copy of the continuous record is printed at the end of each 24-hour monitoring period. A gate can be closed to control flow from the polishing pond. Pond level records are maintained.

UNIT PROCESS: Post Aeration

VPDES Outfall No. 101

1. Number of units: 1

   Number of units in operation: 1

2. Proper flow distribution between units? [ ] Yes [ ] No [x] N/A

3. Evidence of following problems:

a. Dead spots? [ ] Yes [x] No

b. Excessive foam? [ ] Yes [x] No

c. Poor aeration? [ ] Yes [x] No

d. Mechanical equipment failure? [ ] Yes [ ] No [x] N/A

4. How is the aerator controlled? [ ] Time clock [ ] Manual [ ] Continuous [ ] Other _____ [x] N/A

5. What is the current operating schedule? continuous – step cascade

6. Step weirs level? [x] Yes [ ] No [ ] N/A

7. Effluent D.O. level: not checked during inspection mg/L

8. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: None

UNIT PROCESS: Effluent/Plant Outfall

VPDES Outfall No. 101

1. Type outfall: [x] Shore based [ ] Submerged

2. Type if shore based: [x] Wingwall [ ] Headwall [x] Rip Rap [ ] N/A

3. Flapper valve? [ ] Yes [x] No

4. Erosion of bank? [ ] Yes* [x] No [ ] N/A

5. Effluent plume visible? [ ] Yes * [x] No

Comments: The discharge was fairly clear to slightly green in color. VPDES Outfall 101 discharges to VPDES Outfall 001.

6. Condition of outfall and supporting structures: [x] Good [ ] Fair [ ] Poor *

7. Final effluent, evidence of following problems:

   a. Oil sheen? [ ] Yes* [x] No

   b. Grease? [ ] Yes* [x] No

   c. Sludge bar? [ ] Yes* [x] No

   d. Turbid effluent? [ ] Yes* [x] No

   e. Visible foam? [ ] Yes* [x] No

   f. Unusual odor? [ ] Yes* [x] No

Comments: Outfall 101 discharge pH was 8.72 S.U. at the time of the inspection; temperature 78.4 °C. The temperature in the auto sampler was 4°C.

UNIT PROCESS: Effluent/Plant Outfall

VPDES Outfall No. 102

Comments: See outfall description on page six.

UNIT PROCESS: Flow Measurement

VPDES Outfall No. 103 (Ground Water)

1. Type measuring device: Honeywell In-line Magnetic Meter

2. Present reading: 34 g.p.m.

3. Bypass channel? [ ] Yes [x] No

   Metered? [ ] Yes [ ] No* [x] N/A

4. Return flows discharged upstream from meter? [ ] Yes [x] No

   If Yes, identify: N/A

5. Device operating properly? [x] Yes [ ] No*

6. Date of last calibration: 9/20/07

7. Evidence of following problems:

   a. Obstructions? [ ] Yes* [x] No

   b. Grease? [ ] Yes* [x] No

8. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: #2 The discharge flow from the Ground Water Treatment Facility. The quench and scrubber system has been eliminated. pH is lowered to keep iron in solution. At the time of inspection, the pH was 4.05 S.U.; 19.7 °C. #6: The flow meter is annually cleaned and sent to Advanced Technologies for calibration. The discharge from Outfall 103 combines with the discharge from Outfall 102 (Water Treatment Plant) and flows to the VPDES Outfall 001 discharge channel. The flow from Outfall 102 is estimated based on the amount and length of backwashes.

UNIT PROCESS: Effluent/Plant Outfall

VPDES Outfall No. 103 (Ground Water)

1. Type outfall: [x] Shore based [ ] Submerged

2. Type if shore based: [ ] Wingwall [ ] Headwall [x] Rip Rap [ ] N/A

3. Flapper valve? [ ] Yes [x] No

4. Erosion of bank? [ ] Yes* [x] No [ ] N/A

5. Effluent plume visible? [ ] Yes * [x] No

Comments: VPDES Outfall 103 discharges to VPDES Outfall 001.

6. Condition of outfall and supporting structures: [x] Good [ ] Fair [ ] Poor *

7. Final effluent, evidence of following problems:

   a. Oil sheen? [ ] Yes* [x] No

   b. Grease? [ ] Yes* [x] No

   c. Sludge bar? [ ] Yes* [x] No

   d. Turbid effluent? [ ] Yes* [x] No

   e. Visible foam? [ ] Yes* [x] No

   f. Unusual odor? [ ] Yes* [x] No

Comments: None.

UNIT PROCESS: Effluent/Plant Outfall

VPDES Outfall No. 001

1. Type outfall: [x] Shore based [ ] Submerged

2. Type if shore based: [ ] Wingwall [ ] Headwall [x] Rip Rap [ ] N/A

3. Flapper valve? [ ] Yes [x] No

4. Erosion of bank? [ ] Yes* [x] No [ ] N/A

5. Effluent plume visible? [ ] Yes * [x] No

Comments: The discharge was slightly cloudy. The discharge channel (creek-like) appeared to be in good condition. The Receiving Stream, James River, was not inspected.

6. Condition of outfall and supporting structures: [x] Good [ ] Fair [ ] Poor *

7. Final effluent, evidence of following problems:

   a. Oil sheen? [ ] Yes* [x] No

   b. Grease? [ ] Yes* [x] No

   c. Sludge bar? [ ] Yes* [x] No

   d. Turbid effluent? [ ] Yes* [x] No

   e. Visible foam? [ ] Yes* [x] No

   f. Unusual odor? [ ] Yes* [x] No

Comments: VPDES Outfall No. 001 receives storm water, and discharges from internal VPDES Outfall Nos. 101, 102, and 103. Flow, temperature, and pH are continuously monitored below the parshall flume. The permittee maintains a Certified Wildlife Habitat Area that runs parallel to the VPDES Outfall 001 discharge channel.

cc:

[x] Owner: c/o Waverly Smith

[ ] Operator:

[ ] Local Health Department:

[ ] VDH Engineering Field Office: Field Office

[ ] VDH/Central Office - DWE

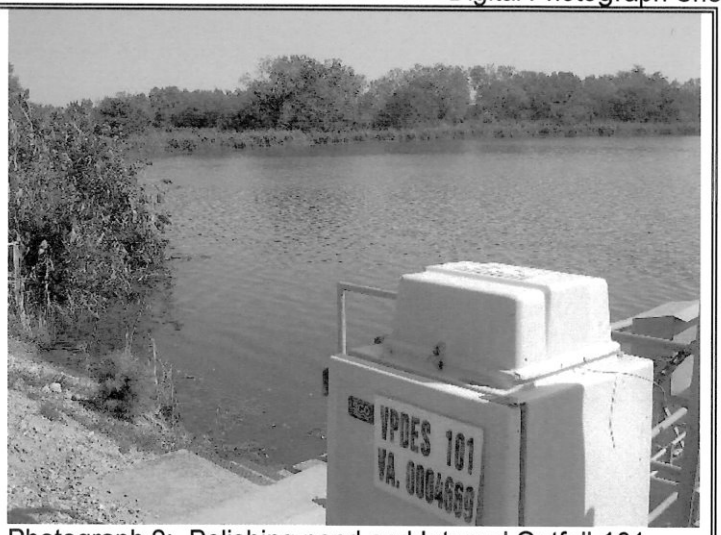
[x] DEQ - OWCP, attn: Steve Stell

[x] DEQ – Water Permits, attn: Ray Jenkins

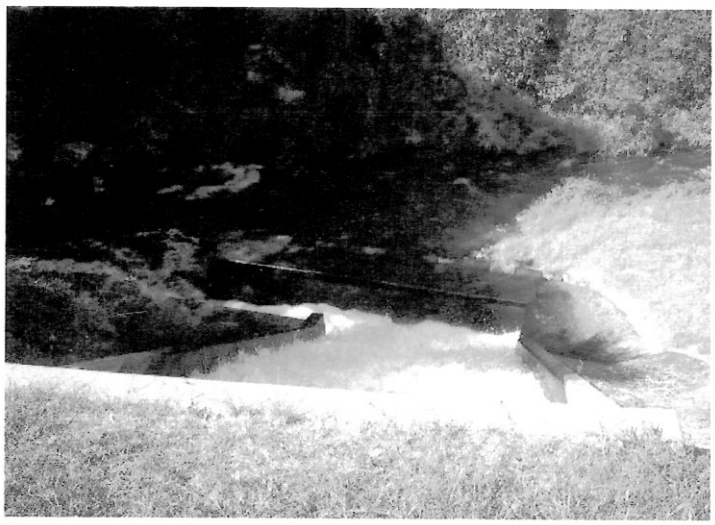
[x] DEQ - Regional Office File

[x] EPA - Region III (via DEQ-OWCP)

Photograph 1: Wastewater aeration basin



Photograph 2: Polishing pond and Internal Outfall 101 sampling point



Photograph 3: Internal Outfall 101 post-aeration

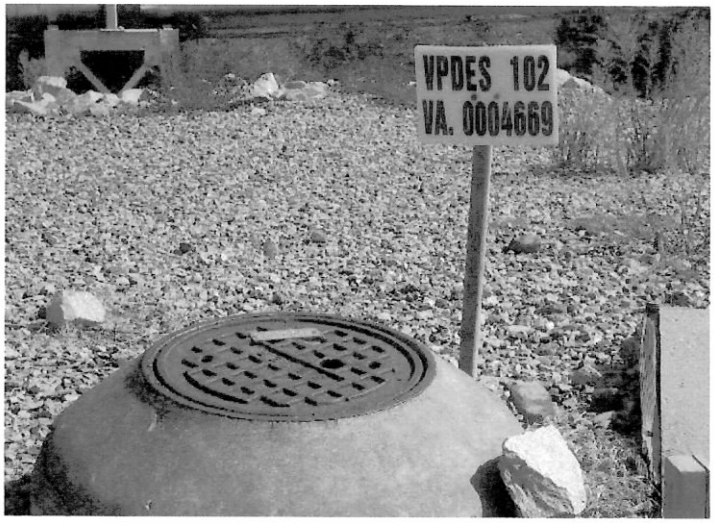
Photograph 4: Internal outfall 103

Photograph 5: Minor foam downstream of Outfall 001 parshall flume

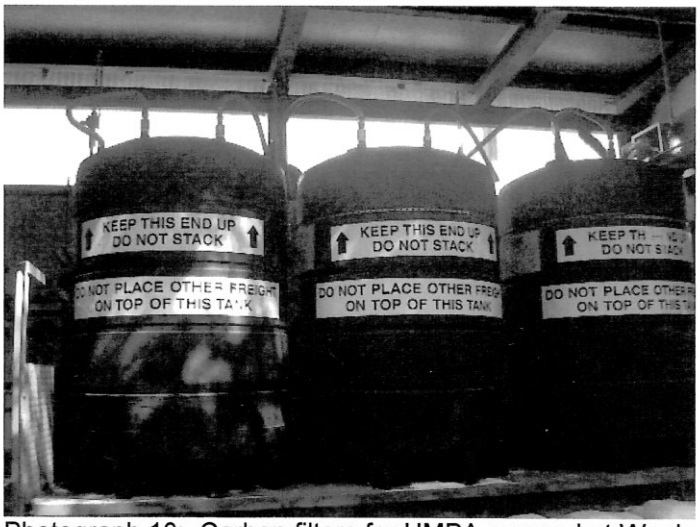
Photograph 6: Outfall 001 sampling point

Photograph 7: Supply water at the Reservoir

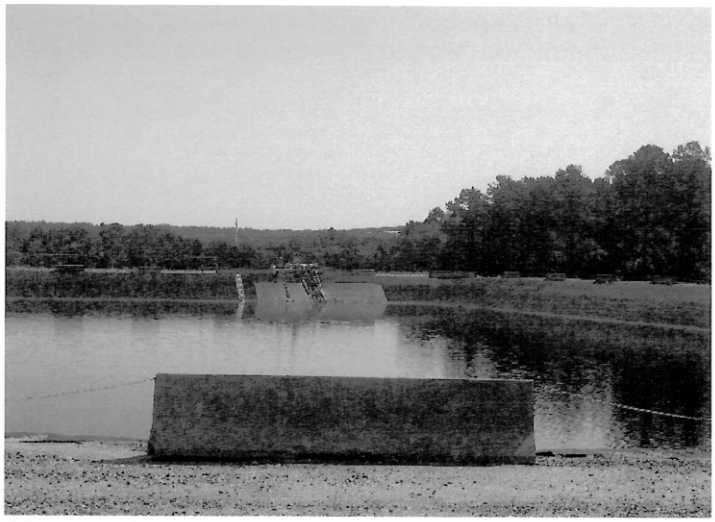
Photograph 8: Spray headers in operation at the Reservoir



Photograph 9: Manhole/sampling point for Internal Outfall 102



Photograph 10: Carbon filters for HMPA removal at Weak Acid Pond



Photograph 11: Weak Acid Pond facing south-east

Photograph 12: Weak Acid Pond facing north-east

Attachment E

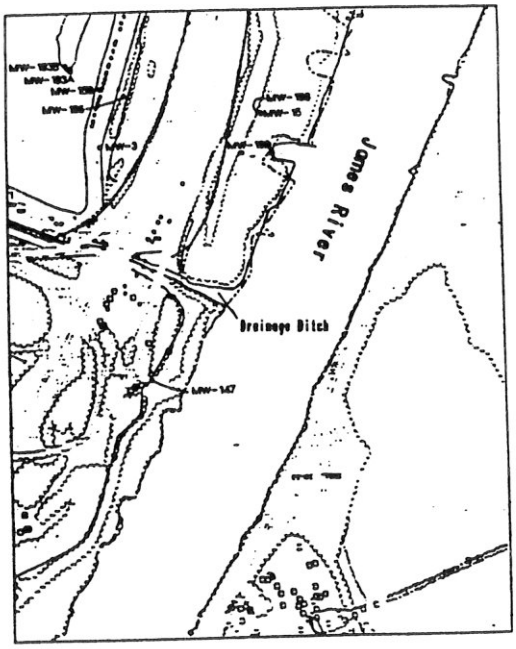
Mixing Zone Model

Final Report

Mixing Zone Modeling of DuPont Spruance Plant Discharge

Submitted to

E.I. du Pont de Nemours and Company
Spruance Plant
P.O. Box 27001
Richmond, VA 23261



by

Wu-Seng Lung, PhD, PE

July 1998

Mixing Zone Modeling of DuPont Spruance Plant Discharge

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MIXING ZONE MODELING OF DUPONT SPRUANCE PLANT DISCHARGE

by Wu-Seng Lung

1. Introduction

This report documents the results from a modeling study performed for the DuPont Spruance Plant to support their upcoming VPDES permit renewal. The Spruance Plant effluent from outfall 001 enters a drainage ditch located in the DuPont property, which in turn enters the tidal James River (Figure 1). The discharge point from the standpoint of permitting and wasteload allocations by Virginia Department of Environmental Quality (VDEQ) is where this effluent stream meets the James River, the receiving water.

When the wastewater from a point source is discharged into the receiving water, its transport may be divided into two stages with distinctive mixing characteristics. Mixing and dilution in the first stage are determined by the initial momentum of the discharge. This initial contact with the receiving water is where the concentration of the effluent will be its greatest in the water column. Normally, the design of the discharge outfall should provide ample momentum to dilute the concentrations in the immediate contact area as quickly as possible. The second stage of mixing covers a more extensive area in which the effect of initial momentum is diminished and the waste is mixed primarily by ambient turbulence.

In the DuPont Spruance Plant case, the effluent is not entering the receiving water from a pipe. Instead, it is from an effluent stream with a width about 75 ft when joining the James River. Therefore, many mixing zone models developed for point source discharges such as CORMIX I, II, and III are not applicable due to the small velocity in the stream when entering the James River. In addition, tidal influence from the James River reaches the effluent stream, resulting in a complicated mass transport pattern.

Recognizing this unique feature at the DuPont Spruance Plant, a technical approach and a modeling framework is developed to quantify the mixing zone of the effluent. Data from the effluent and the receiving water are used to support this modeling analysis. This report documents the data analysis and model development effort. Every attempt has been made to present the interpretation of the results in a clear manner to support the permit renewal process.

2. Mixing Zone Regulations

2.1 Federal Guidelines

For toxic discharges, U.S. EPA recommends careful evaluation of mixing to prevent zones of chronic toxicity that extend for excessive distances because of poor mixing. U.S. EPA maintains two water quality criteria for the allowable magnitude of toxic substances: a criterion maximum concentration (CMC) to protect against acute or lethal effects; and a criterion continuous

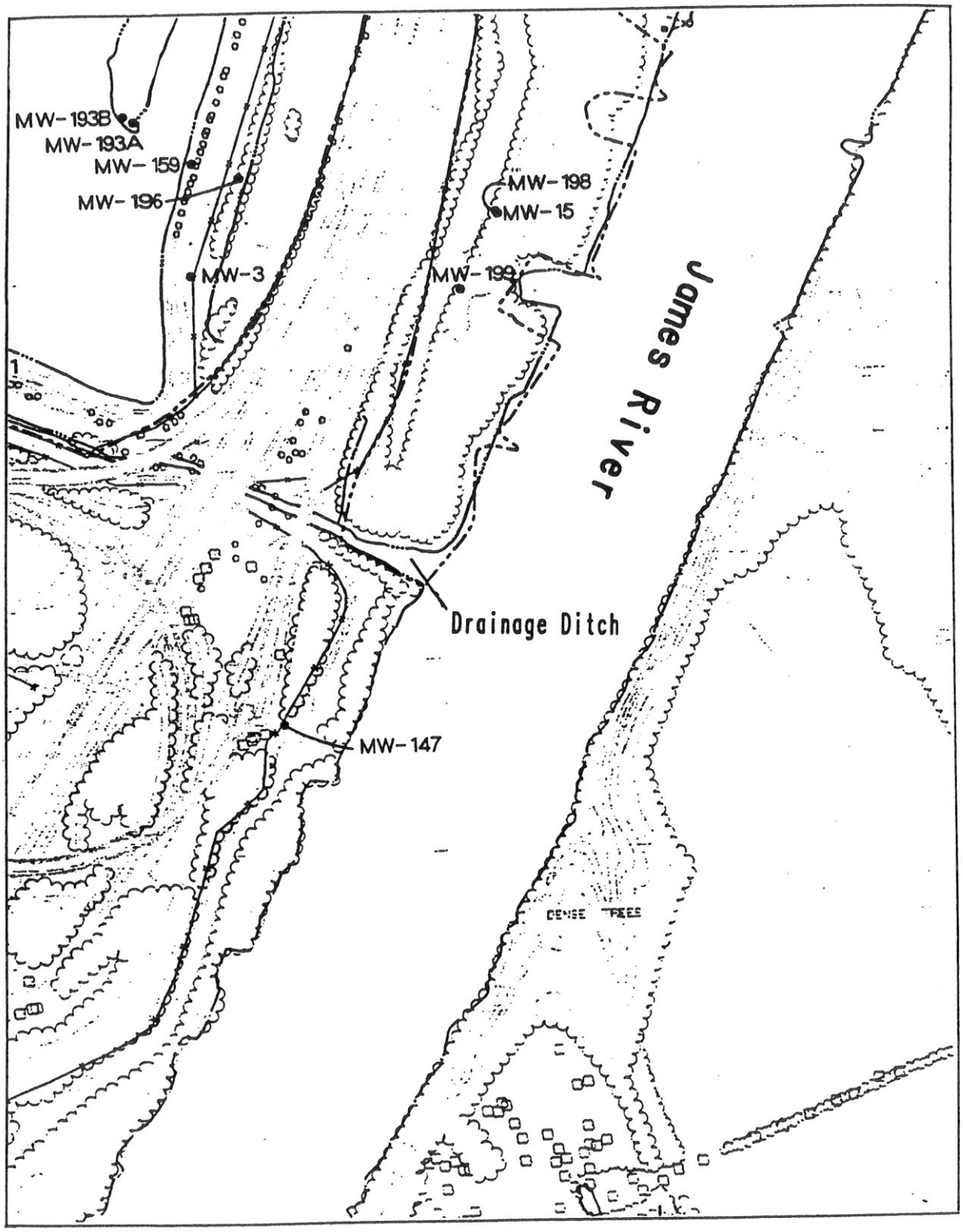

Figure 1. Effluent Stream from DuPont Spruance Plant and James River

concentration (CCC) to protect against chronic effects.

In rivers or tidal rivers such as the study area in the James River that has a persistent throughflow in the downstream direction and do not exhibit significant natural density stratification, hydrologically based flows 1Q10 and 7Q10 for the CMC and CCC, respectively, have been used traditionally in steady-state mixing zone modeling analysis and will be used in this study.

Lethality to passing organisms can be prevented in the mixing zone in one of four ways (U.S. EPA, 1991). The first method is to prohibit concentrations in excess of the CMC in the pipe itself, as measured directly at the end of the pipe. The second method is to use high-velocity discharge with an initial velocity of 3 m/s, or more, together with a mixing zone spatial limitation of 50 times the discharge length scale in any direction. The third alternative is not use a high-velocity discharge. Rather the discharger should provide data to the State regulatory agency showing that the most restrictive of the following conditions are met:

- The CMC should be met within 10% of the distance from the edge of the outfall structure to the edge of the regulatory mixing zone in any spatial direction.
- The CMC should be met within a distance of 50 times the discharge length scale in any spatial direction.
- The CMC should be met within a distance of five times the local water depth in any horizontal direction from any discharge outlet.

A fourth alternative is for the discharger to provide data to the State regulatory agency showing that a drifting organism would not be exposed to 1-hour average concentrations exceeding the CMC, or would not receive harmful exposure when evaluated by other valid toxicological analysis.

2.2 *Virginia Mixing Zone Regulations*

In the amendments to the Water Quality Standards proposed by the SWCB in 1991, Section VR680-21-01.2.C allows mixing zones. However, no mixing zone established by the SWCB shall:

- Interfere with passing or drifting aquatic organisms;
- Cause acute lethality to passing or drifting aquatic organisms;
- Be used for, or considered as, a substitute for minimum treatment technology required by the Clean Water Act and other applicable State and Federal laws.
- Constitute more than one-half of the width of the receiving watercourse nor constitute more than one-third of the area of any cross section of the receiving watercourse.
- Extend downstream at any time a distance more than five times the width of the receiving watercourse at the point of discharge.

Further, an allocated impact zone may be allowed within a regulatory mixing zone. This zone is the area of initial dilution of the effluent with the receiving water where the concentration of the effluent will be its greatest in the water column. Mixing within these allocated impact zones shall be as quick as practical and shall be sized to prevent lethality to passing aquatic

organisms. Mixing zones shall be determined (i.e., allowed) such that acute standards are met outside the allocated impact zone and chronic standards are met at the edge of the regulatory mixing zone.

3. Technical Approach

3.1 Initial Dilution of the DuPont Spruance Plant Effluent

It is important to demonstrate the momentum impact of the effluent on initial dilution. Assume that the effluent is entering the James River via a 4-ft diameter pipe. With a maximum flow rate of 40 MGD, the velocity entering the receiving water is about 2.32 ft/s, generating a momentum flux of 580 ft^4/s^2. The initial dilution of a momentum-induced mixing can be determined as:

$$S = 0.17 \frac{M_o{}^2 \, l_m}{2 \, Q_o} \tag{1}$$

where S is the initial dilution, M_o is momentum flux (= 580 ft^4/s^2, Q_o is effluent flow rate (= 40 MGD), and l_m is the distance from the discharge point. Using a l_m of 27 ft, i.e., the size of the allocated impact zone (see derivation in a later section), Equation 1 gives S = 0.928 (< 1.0). It is clear from this calculation that the effluent lacks momentum to provide any initial dilution (> 1.0). Therefore, ambient turbulence is the primary force to provide mixing and dilution for the effluent in the James River.

Note that the above calculations are based on the assumption of a single discharge pipe. In reality, the DuPont Spruance Plant's discharge entering the James River from the effluent stream is much weaker in momentum flux. This fact not only indicates that the ambient James River condition controls the mixing but also underscores that any momentum-based mixing models such as CORMIXs are not appropriate to address this problem.

3.2 Conservative Assumptions

Data from the study area have suggested that the first two methods of preventing lethality are not applicable to the DuPont Spruance Plant discharge. As indicated above, the velocity entering the James River is relatively small (much less than 3 m/s). The study effort is therefore focused on alternative 3, providing data and information to the State, expecting that CMC can be met within the mixing zone as required.

Following a consultation with the staff of VDEQ in September 1997, a conservative approach of analysis was adopted. That is, initial dilution modeling would be bypassed, thereby neglecting discharge-induced mixing. No credit would be given for the momentum-induced mixing; mixing between the effluent and the river water is achieved only by turbulent mixing in the ambient water (i.e., James River). Further, the effluent being modeled is assumed to be a conservative substance, given the fine spatial and temporal scales associated with the mixing zone.

3.3 *Two-Dimensional Mass Transport Model*

Fischer *et al.* (1979) presented the following two-dimensional mass transport model for ambient mixing in rivers:

$$C(x,y) = \frac{M}{du(4\pi D_y x/u)^{1/2}} \exp(\frac{-y^2 u}{4D_y x}) \tag{2}$$

where

C = concentration at any given location
M = mass discharged / unit time
u = average velocity in the river
D_y = dispersion coefficient across the river
x = distance downstream from the diffusers
y = distance in lateral direction
d = average depth in the river

The James River near the DuPont Spruance Plant is under tidal influence, characterized by longitudinal dispersion (spread) of the effluent. Thus, Eq. 2 must be modified to incorporate the longitudinal spread along the James River.

Lung (1995) developed a simplified, analytical solution to track the fate and transport of pollutants in estuaries in a two-dimensional configuration. He applied that model to the Falling Creek wastewater treatment plant discharging directly into the James River. In fact, the Falling Creek Plant outfall is located very close to the DuPont Spruance Plant along the James River.

For the study area where the river is sufficiently wide, the solution may be approximated by the following expression for a conservative substance (Lung, 1995):

$$C = \frac{M}{\pi\, d\, (D_x\, D_y)^{1/2}} \exp(\frac{u\, x}{2\, D_x}) K_0 [\frac{u}{2\, D_x^{1/2}} (\frac{x^2}{D_x} + \frac{y^2}{D_y})^{1/2}] \tag{3}$$

where

D_x is the longitudinal dispersion coefficient and
K_0 is the modified Bessel function of the second kind of order zero.

Equation 3 represents a modification of Eq. 2 by incorporating the longitudinal dispersion in a tidal river and is used in this study to quantify the far-field mixing.

3.4 *Toxicity Modeling*

To apply the steady-state calculations (Eq. 3) to effluent toxicity modeling, the percent effluent measurements should be converted to toxic units (TUs). It is therefore, necessary to convert toxicity to units that can be directly related to mass. When comparing toxicity among chemicals, the relationship between toxicity and concentration is inverse; chemicals that have toxic effects at low concentrations have a greater "toxicity" than chemicals that have toxic effects at higher concentrations. The modeling of toxic effluents is based on mass balance principles (as Eq. 3 is derived); therefore, toxicity needs to be in units that increase when the percent of the effluent of the receiving stream increases. Thus, a TU is the reciprocal of the dilution that produces the test endpoint, i.e., acute toxicity endpoint (ATE) or chronic toxicity endpoint (CTE). An acute toxic unit (TU_a) is the reciprocal of an ATE. A chronic toxic unit (TU_c) is the reciprocal of a CTE. The acute toxicity unit is defined as:

$$TU_a = \frac{100}{LC_{50}} \tag{4}$$

where LC_{50} is the percent effluent that causes 50 percent of the organisms to die by the end of the acute exposure period. For example, an effluent that is found to have an LC_{50} of 5% is an effluent containing 20 TU_as. A similar definition can be expressed for chronic toxicity, TU_c.

The wasteload allocations must ensure that the CMC and the CCC are met in the receiving water at the desired duration and frequency. The CMC for toxicity is recommended as 0.3 TU_a (EPA, 1991). This is a value that should prevent lethality unless the duration of exposure exceeds 1 hour. Similarly, the chronic toxicity unit is defined as:

$$TU_c = \frac{100}{NOEC} \tag{5}$$

where *NOEC* is the highest tested concentration of the effluent at which no adverse effects are observed and is expressed in terms of percent effluent. The CCC for toxicity measured with chronic tests is recommended as the following: CCC = 1.0 TU_c (EPA, 1991).

4. Data Analysis

4.1 *1Q10 and 7Q10 Low Flows*

According to the fact sheet for the VPDES permit of the Spruance Plant, the 1Q10 low flow and 7Q10 low flow for the study area are 648 cfs and 719 cfs, respectively. The cross-sectional area of the James River at the Spruance Plant is 14,012 ft^2 which is considered a tidally averaged value for both low flows. Over a tidal cycle, the cross-sectional area remains relatively constant under these low flow conditions

4.2 *Dimensions of the Regulatory Mixing Zone and Allocated Impact Zone*

The dimensions of the allocated impact zone within which the CMC is met depends on the size of the regulatory mixing zone as specified in the State Water Quality Standards. In this analysis, they are calculated in the following steps:

1. The length of the regulatory mixing zone = 2,700 ft (5 times the river width)
2. The width of the regulatory mixing zone = 270 ft (one-half of the river width)
3. The CMC should be met within 10% of the lateral distance from the edge of the outfall structure (the drainage ditch in this case) to the edge of the mixing zone = 27 ft (10% of 270 ft)
4. The CMC should be met within a distance of 50 times the discharge length scale in any spatial direction. This does not apply to the DuPont Spruance Plant as there is no outfall pipe entering directly into the James River.
5. The CMC should be met within a distance of five times the local water depth = 125 ft (5 times 25 ft)

Based on the above guidelines, the regulatory mixing zone is defined by a rectangle of 2,700 ft (along the river) and 270 ft (across the river). The CCC should be met at the edge of this rectangle. The allocated impact zone is a semi-circle with a radius of 27 ft. As such, the CMC should be met at the edge of this zone.

4.3 *Hydraulic Geometry and Ambient Transport Coefficients*

The cross-sectional area of the river channel at the study site under tidally averaged conditions is approximately 13,345 ft^2. The average depth is 25 ft. Under the 1Q10 low flow of 605 cfs in the study area, the tidally averaged velocity in the James River is 0.045 ft/s. The tidally average velocity under the 7Q10 low flow condition is 0.053 ft/s.

Longitudinal and lateral dispersion coefficient values need to be assigned. Lung (1995) used a longitudinal dispersion coefficient of 10 ft^2/s and a lateral dispersion coefficient of 2 ft^2/s for the Falling Creek mixing zone study. These values are used for this modeling analysis. It should be pointed out that the longitudinal dispersion coefficient used in the current VPDES permit is 323 ft^2/s (= 1 mi^2/day), a reasonable estimate considering the longitudinal dispersion in the one-dimensional tidal river without vertical and lateral concentration gradients. That is, it is used for the water column outside of the mixing zone when the effluent and river water is completely mixed. On the other hand, the smaller value of 10 ft^2/s used in this study is justified because of the smaller spatial scales associated with the mixing zones. In addition, the smaller value (i.e., less mixing) results in more conservative results.

5. Model Results

5.1 Evaluation of Whole Effluent Toxicity

The model based on Eq. 3 is applied to the DuPont Spruance Plant discharge with the following data:

- Effluent flow rate = 40 MGD
- Effluent acute toxicity = 1.0 TU_a (LC_{50} = 100% from Biological Monitoring, Inc., 1996)
- Effluent chronic toxicity = 1.0 TU_c (NOEC = 100% from Biological Monitoring, Inc., 1996)
- River velocity = 0.046 ft/s (1Q10 low flow condition) and 0.053 ft/s (7Q10 low flow condition)
- Longitudinal dispersion coefficient = 10 ft^2/s
- Lateral dispersion coefficient = 1.0 ft^2/s
- River depth = 25 ft

Since the effluent stream is not a single pipe, its strength is greatly reduced. To closely mimic the effluent stream, its flow rate is divided into five parts. The effluent therefore enters the James River as if it is coming out from a diffuser system with five ports. Again, this is a conservative assumption as in reality, the effluent should be divided into an infinite number of parts. Results of the model simulation for the acute toxicity assessment are presented in Figure 2, in which two isopleth toxicity contours are shown. Contour No. 1 has a toxicity level of 0.25 TU_a and contour No. 2 represents the toxicity level of 0.16 TU_a. Both toxicity levels are much lower than 0.3 TU_a well within the allocated impact zone (a semi-circle of a 27-ft radius). It is clear that dividing the effluent flow rate to 10 parts (4 MGD each) or more will further reduce the toxicity levels, thereby easily meeting the CMC of 0.3 TU_a at the edge of the allocated impact zone for acute toxicity assessment.

Results for chronic toxicity assessment are displayed in Figure 3. Again, a 1 TU_c toxicity level in the effluent is reduced to 0.10 TU_c well within the regulatory mixing zone where 1 TU_c must be met. It should be pointed out that results in Figure 3 are based on a single pipe discharge with a total flow rate of 40 MGD. It is expected that dividing the flow rate into multiple parts will greatly reduce the strength of the effluent, thereby closer to the field condition. Nevertheless, the single pipe configuration offers a very conservative assumption yet still meeting the mixing zone regulations.

5.2 Evaluation of Temperature Impact

The model can also be configured to calculate the temperature in the regulatory mixing zone and allocated impact zone. The effluent temperature is assumed to be 40°C as used in the completely mixed temperature calculation in the current permit. It should be pointed out that this temperature may be overly high as the data indicates that most effluent temperatures

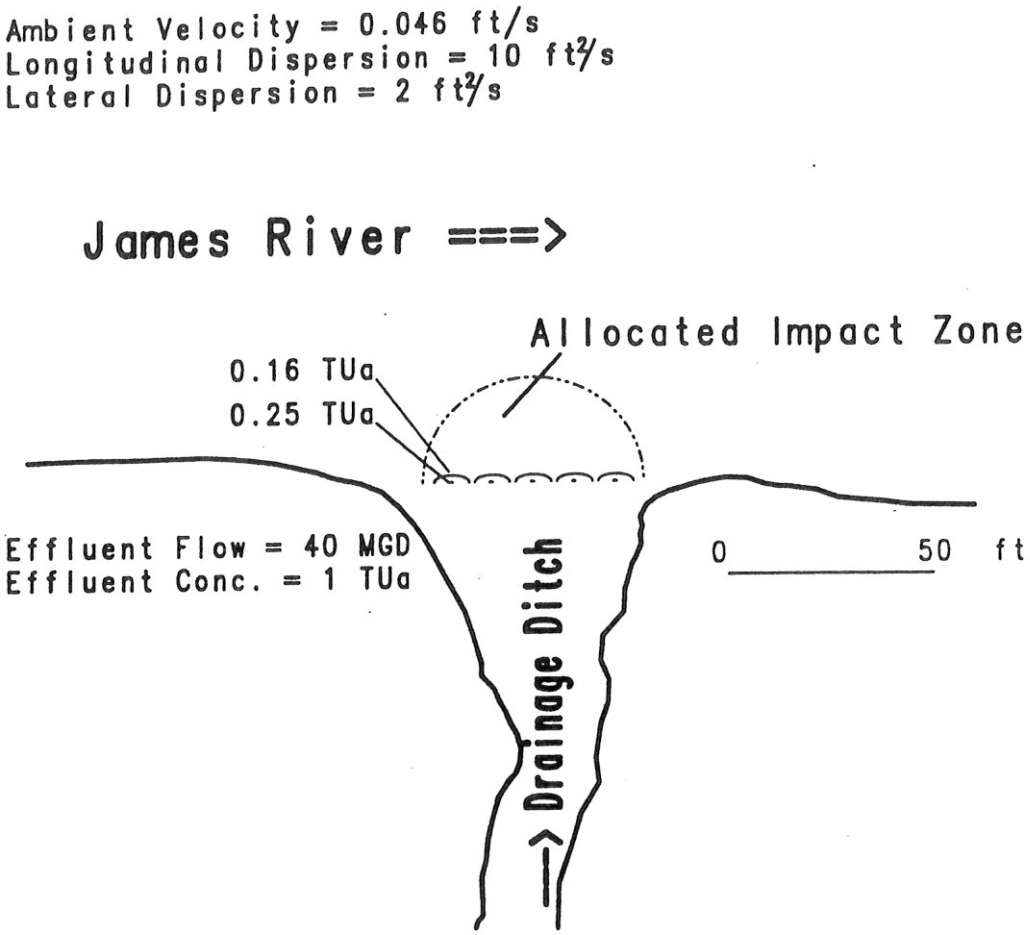

Figure 2. Model Calculated Isopleths with Acute Toxicity in the Effluent = 1 TU_a (40 MGD)

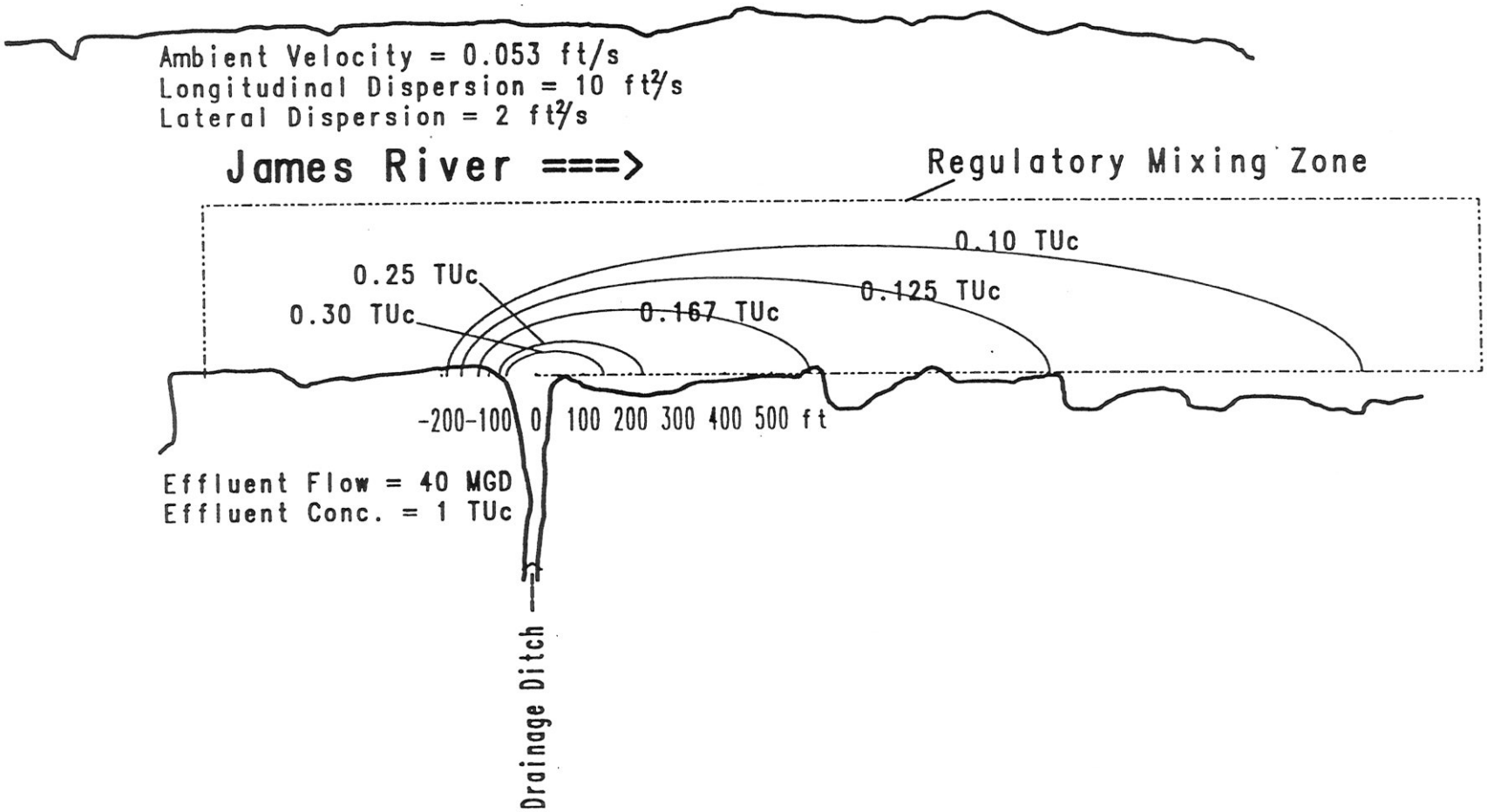

Figure 3. Model Calculated Isopleths with Chronic Toxicity in the Effluent = 1 TU_c (40 MGD)

measured at the outfall rarely exceed 30°C. Again, the 40°C value would result in conservative calculations. Ambient water conditions such as river velocities and dispersion coefficients are not changed from the toxicity modeling analysis. Figure 4 shows that temperature rises of 10°C and 6.667°C (isopleths) within the allocated impact zone resulting from the effluent temperature of 40°C. Figure 5 presents the calculated temperature rise isopleths within the regulatory mixing zone. It is expected that the temperature rise will be lowered to 3°C by the edge of the regulatory mixing zone.

5.3 Modeling Other Contaminants

Perhaps dilution ratios in the allocated impact zone and regulatory mixing zone may be calculated to assist the modeling of other contaminants. As in the temperature mixing zone modeling, the same ambient transport parameter values are used in this modeling analysis. Figure 6 shows the dilution ratio isopleths of 4:1 and 6:1 within the allocated impact zone (AIZ). Within the regulatory mixing zone (RMZ), a dilution ratio of 10:1 is reached (Figure 7). Results of the contaminant modeling can be summarized in Table 1 using the results from Figures 6 and 7.

Table 1 - Summary of Mixing Zone Modeling of Contaminants (40 MGD)

Contaminant	Eff. Conc.	x6.25 Conc. at edge of AIZ[a]	Acute Standard	x10 Conc. at edge of RMZ[b]	Chronic Standard
Acute Toxicity (TU_a)	1.0[c]	0.16	0.30		
Chronic Toxicity (TU_c)	1.0[c]			0.10	1.0
Temperature (°C)	37.61[g]	$\Delta T^e = 6.27$		$\Delta T^e = 3.76$	
Arsenic (µg/L)	3.0[f]	0.5	360	0.3	190
Cadmium (µg/L)	0.48[f]	0.080	2.50	0.048	0.83
Copper (µg/L)	5.0[f]	0.833	12.154	0.50	8.397
Nickel (µg/L)	16.7[f]	2.783	1010.671	1.67	112.356
Selenium (µg/L)	4.0[f]	0.667	20	0.40	5
Silver (µg/L)	0.09[f]	0.015	2.038	0.009	
Zinc (µg/L)	49[f]	8.167	83.349	4.90	75.493
Chromium (µg/L)	1.2[f]	0.20		0.12	
Triv. Chromium (µg/L)	5.7[f]	0.95	1251	0.57	149.1
Hex. Chromium (µg/L)	6.0[f]	1.00	16.0	0.60	11.0
Lead (µg/L)	1.0[f]	0.167	49.037	0.100	1.911
Mercury (µg/L)	0.23[f]	0.038	2.4	0.023	0.012
Ammonia (mg/L)	2.1[g]	0.350	7.45	0.210	1.04
Residual Chlorine (mg/L)	0.33[g]	0.055	0.019	0.033	0.011

a. 1Q10 low flow condition
b. 7Q10 low flow condition
c. Biological Monitoring, Inc. (1996)
d. VPDES permit
e. temperature rise
f. DuPont data (1994-1997) - maximum dissolved concentrations in effluent
g. DuPont data (1996) - maximum levels measured in effluent

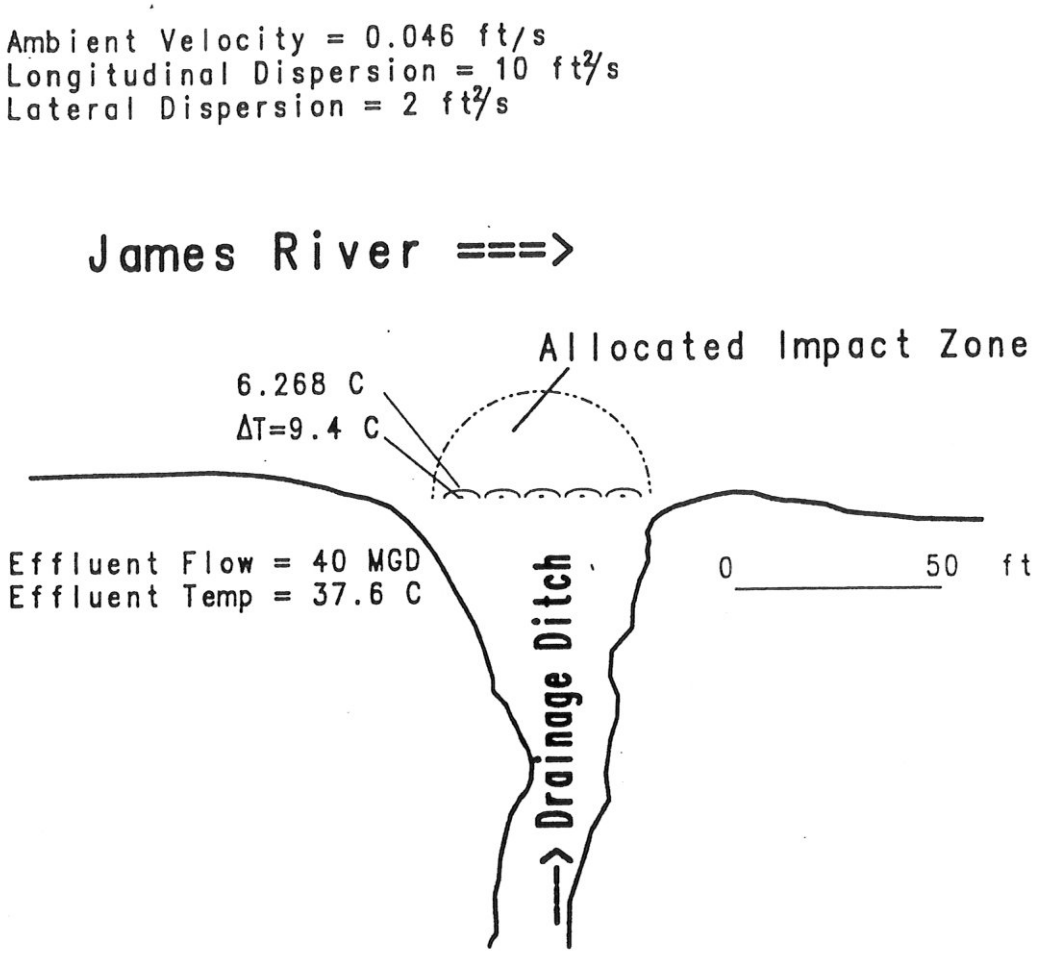

Figure 4. Model Calculated ΔT Isopleths in Allocated Impact Zone with Temperature in the Effluent = 37.6°C (40 MGD)

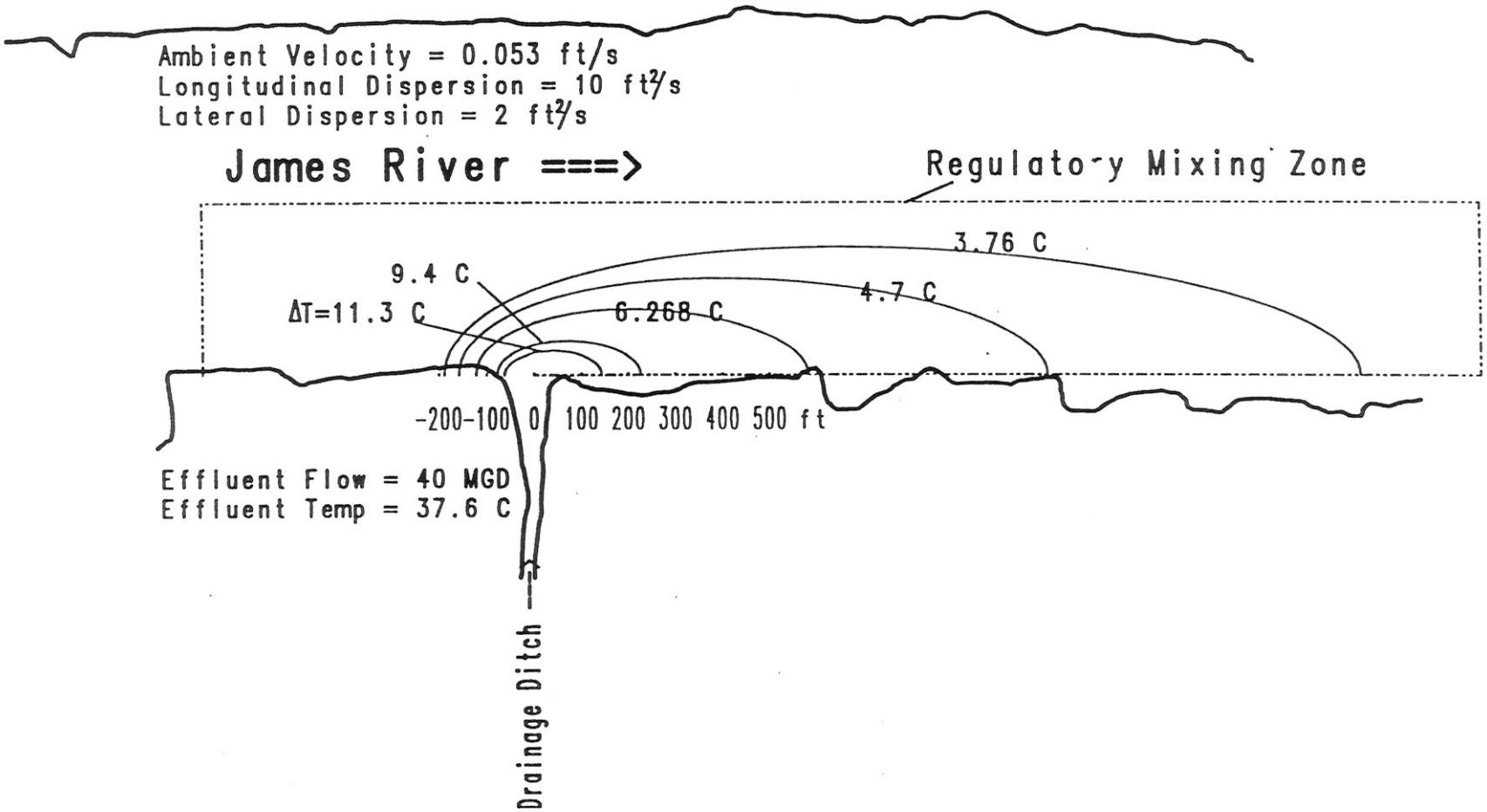

Figure 5. Model Calculated ΔT Isopleths in Regulatory Mixing Zone with Temperature in the Effluent = 37.6°C (40 MGD)

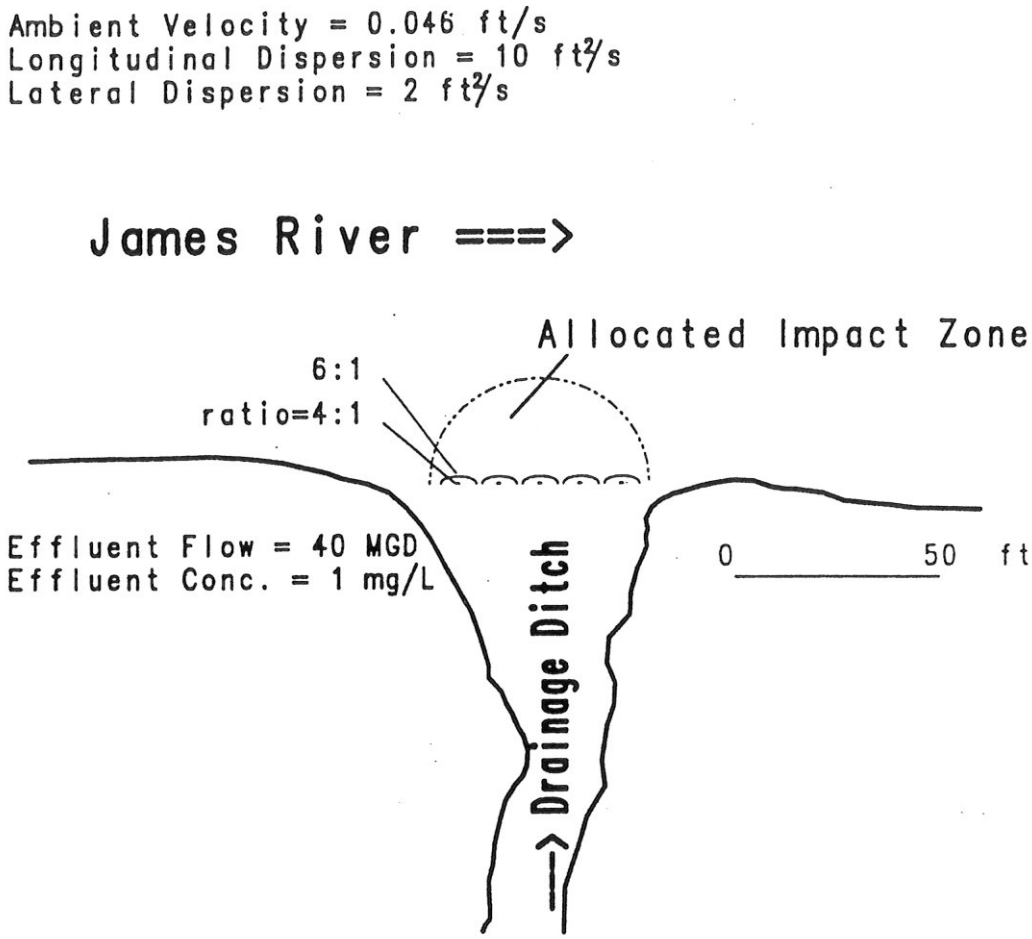

Figure 6. Model Calculated Dilution Ratios in Allocated Impact Zone (40 MGD)

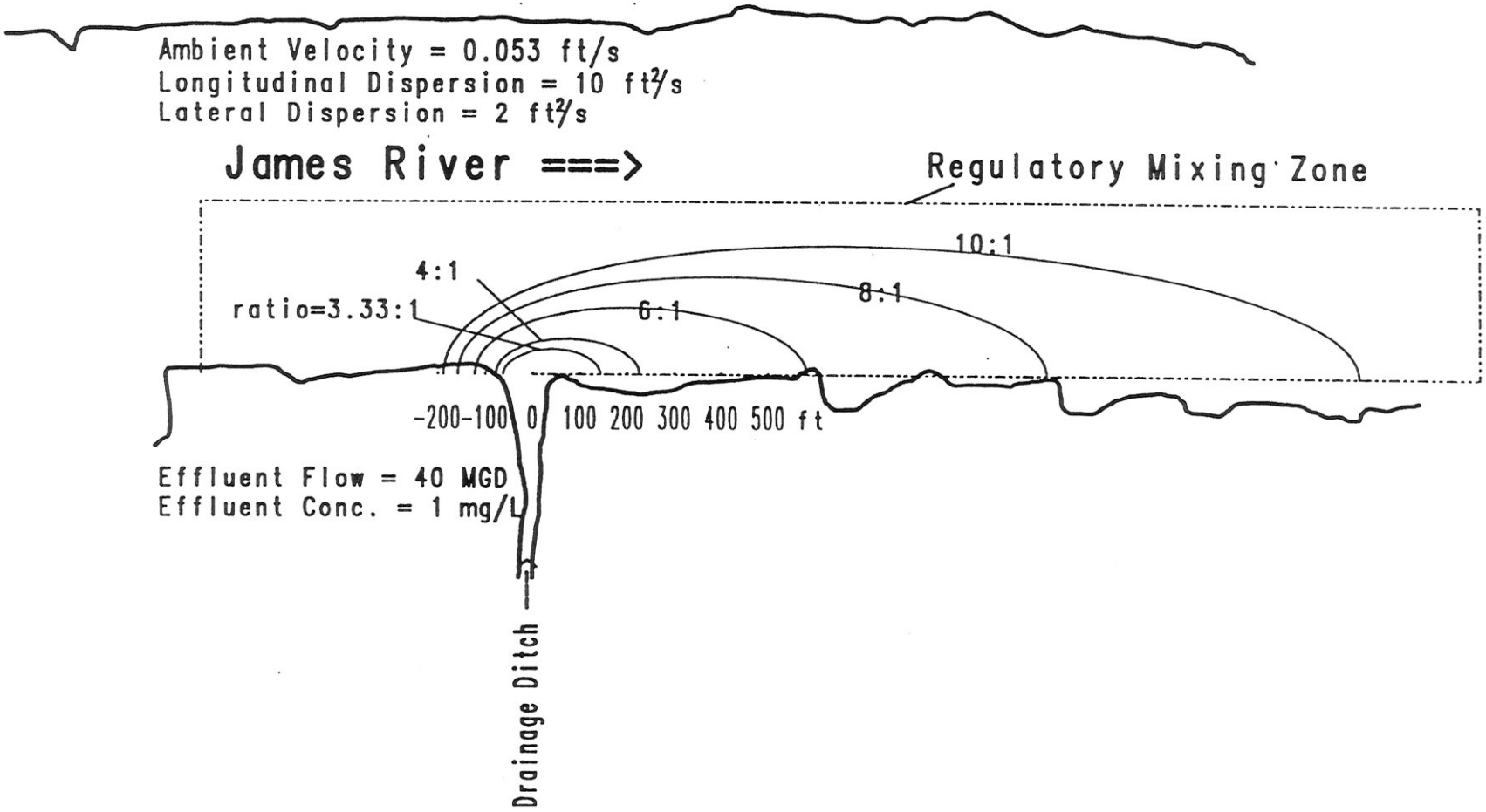

Figure 7. Model Calculated Dilution Ratios in Regulatory Mixing Zone (40 MGD)

Table 1 shows that all concentrations at the edge of the AIZ are lower than the acute standard. All concentrations at the edge of the RMZ are lower than the chronic standard except mercury. It should be pointed out that the calculated concentrations in AIZ and RMZ are based on maximum effluent concentrations measured at the outfall, representing a very conservative result.

There is no temperature standard in the AIZ and RMZ. Instead, a maximum temperature rise of 3°C is allowed when the effluent flow and ambient river flow are completely mixed. The maximum temperature rise outside the RMZ under the 7Q10 low flow condition is 2.98°C, slightly below the allowable temperature rise of 3°C.

There is no chlorine residual standard in the AIZ and RMZ. The maximum concentration measured in the effluent in 1996 is 0.33 mg/L, meeting the effluent limit set by the current VPDES permit.

6. Model Sensitivity Analysis

A model sensitivity analysis for wastewater flow rates of 60 MGD and 20 MGD were conducted, i.e., varying the flow rate by 50% of 40 MGD. Plots of the model results can be found in the Appendix. The results are summarized in Tables 2 and 3 for wastewater flow rates of 60 MGD and 20 MGD, respectively.

7. Summary and Conclusions

A mixing zone model is developed for the DuPont Spruance Plant discharge. The model is configured to quantify toxicity concentrations, temperature rises, and chemical concentrations within the allocated impact zone and regulatory mixing zone. Recent monitoring data at the plant is used to derive the effluent levels of acute toxicity, chronic toxicity, temperature, and chemicals. The model is applied to two low flow conditions (1Q10 and 7Q10) to assess the mixing in the allocated impact zone and regulatory mixing zone, respectively.

Model results show that CMC of 0.3 TU_a and CCC of 1 TU_c in the effluent flow of 40 MGD are easily met at the edge of the allocated impact zone and regulatory mixing zone, respectively. Chemical concentrations calculated in these two zones are much lower than the water quality standards except the mercury concentration at the edge of the chronic zone which is about twice of the chronic standard. Model sensitivity analysis results for effluent flows of 60 MGD and 20 MGD also show similar conclusions.

References Cited

1. EPA, 1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.
2. Lung, W.S., 1995. Mixing-Zone Modeling for Toxic Waste-Load Allocations. *Journal of Environmental Engineering*, 121(11):839-842.

Table 2 - Summary of Mixing Zone Modeling of Contaminants (60 MGD)

Contaminant	Eff. Conc.	Conc. at edge of AIZ[a] (x4)	Acute Standard	Conc. at edge of RMZ[b] (x7)	Chronic Standard
Acute Toxicity (TU_a)	1.0[c]	0.25	0.30		
Chronic Toxicity (TU_c)	1.0[c]			0.143	1.0
Temperature (°C)	37.61[g]	$\Delta T^e = 9.4$		$\Delta T^e = 5.37$	
Arsenic (µg/L)	3.0[f]	0.75	360	0.429	190
Cadmium (µg/L)	0.48[f]	0.120	2.50	0.069	0.83
Copper (µg/L)	5.0[f]	1.25	12.154	0.714	8.397
Nickel (µg/L)	16.7[f]	4.175	1010.671	2.386	112.356
Selenium (µg/L)	4.0[f]	1.000	20	0.571	5
Silver (µg/L)	0.09[f]	0.023	2.038	0.013	
Zinc (µg/L)	49[f]	12.25	83.349	7.00	75.493
Chromium (µg/L)	1.2[f]	0.30		0.171	
Triv. Chromium (µg/L)	5.7[f]	1.425	1251	0.814	149.1
Hex. Chromium (µg/L)	6.0[f]	1.50	16.0	0.857	11.0
Lead (µg/L)	1.0[f]	0.250	49.037	0.143	1.911
Mercury (µg/L)	0.23[f]	0.058	2.4	0.033	0.012
Ammonia (mg/L)	2.1[g]	0.525	7.45	0.300	1.04
Residual Chlorine (mg/L)	0.33[g]	0.083	0.019	0.047	0.011

a. 1Q10 low flow condition
b. 7Q10 low flow condition
c. Biological Monitoring, Inc. (1996)
d. VPDES permit
e. temperature rise
f. DuPont data (1994-1997) - maximum dissolved concentrations in effluent
g. DuPont data (1996) - maximum levels measured in effluent

* $\frac{\text{MAX Eff} + 7Q10}{\text{MAX Eff}}$ = Dilution Factor

$\frac{56.8 + 465}{56.8} = 9.2X$

Table 3 - Summary of Mixing Zone Modeling of Contaminants (20 MGD)

Contaminant	Eff. Conc.	X 12.5 Conc. at edge of AIZ[a]	Acute Standard	X 20 Conc. at edge of RMZ[b]	Chronic Standard
Acute Toxicity (TU_a)	1.0[c]	0.08	0.30		
Chronic Toxicity (TU_c)	1.0[c]			0.05	1.0
Temperature (°C)	37.61[g]	$\Delta T^e = 3.13$		$\Delta T^e = 1.88$	
Arsenic (µg/L)	3.0[f]	0.24	360	0.15	190
Cadmium (µg/L)	0.48[f]	0.040	2.50	0.024	0.83
Copper (µg/L)	5.0[f]	0.417	12.154	0.250	8.397
Nickel (µg/L)	16.7[f]	1.392	1010.671	0.835	112.356
Selenium (µg/L)	4.0[f]	0.333	20	0.200	5
Silver (µg/L)	0.09[f]	0.008	2.038	0.005	
Zinc (µg/L)	49[f]	4.083	83.349	2.450	75.493
Chromium (µg/L)	1.2[f]	0.10		0.06	
Triv. Chromium (µg/L)	5.7[f]	0.475	1251	0.285	149.1
Hex. Chromium (µg/L)	6.0[f]	0.50	16.0	0.30	11.0
Lead (µg/L)	1.0[f]	0.083	49.037	0.050	1.911
Mercury (µg/L)	0.23[f]	0.019	2.4	0.012	0.012
Ammonia (mg/L)	2.1[g]	0.175	7.45	0.105	1.04
Residual Chlorine (mg/L)	0.33[g]	0.028		0.017	

a. 1Q10 low flow condition
b. 7Q10 low flow condition
c. Biological Monitoring, Inc. (1996)
d. VPDES permit
e. temperature rise
f. DuPont data (1994-1997) - maximum dissolved concentrations in effluent
g. DuPont data (1996) - maximum levels measured in effluent

APPENDIX

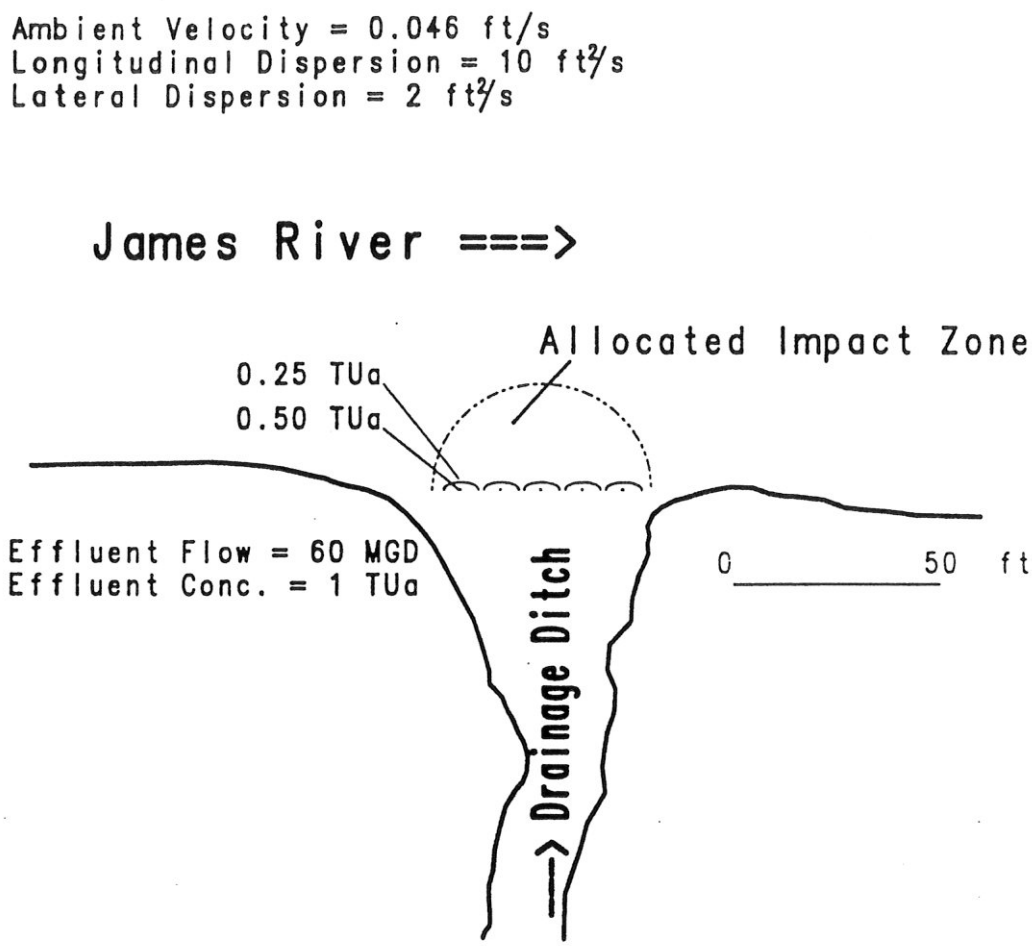

Figure A-1. Model Calculated Isopleths with Acute Toxicity in the Effluent = 1 TU_a (60 MGD)

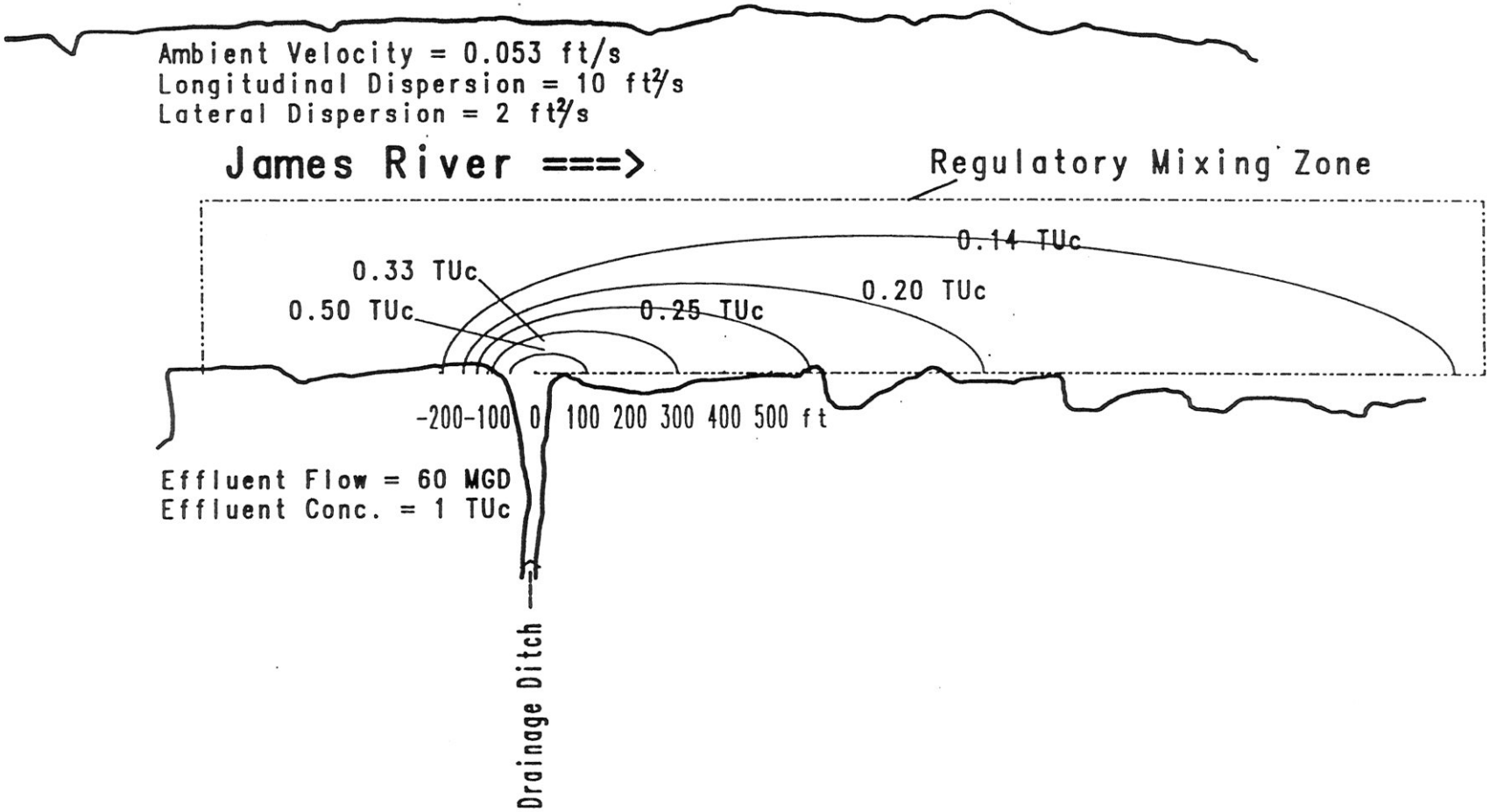

Figure A-2. Model Calculated Isopleths with Chronic Toxicity in the Effluent = 1 TU_c (60 MGD)

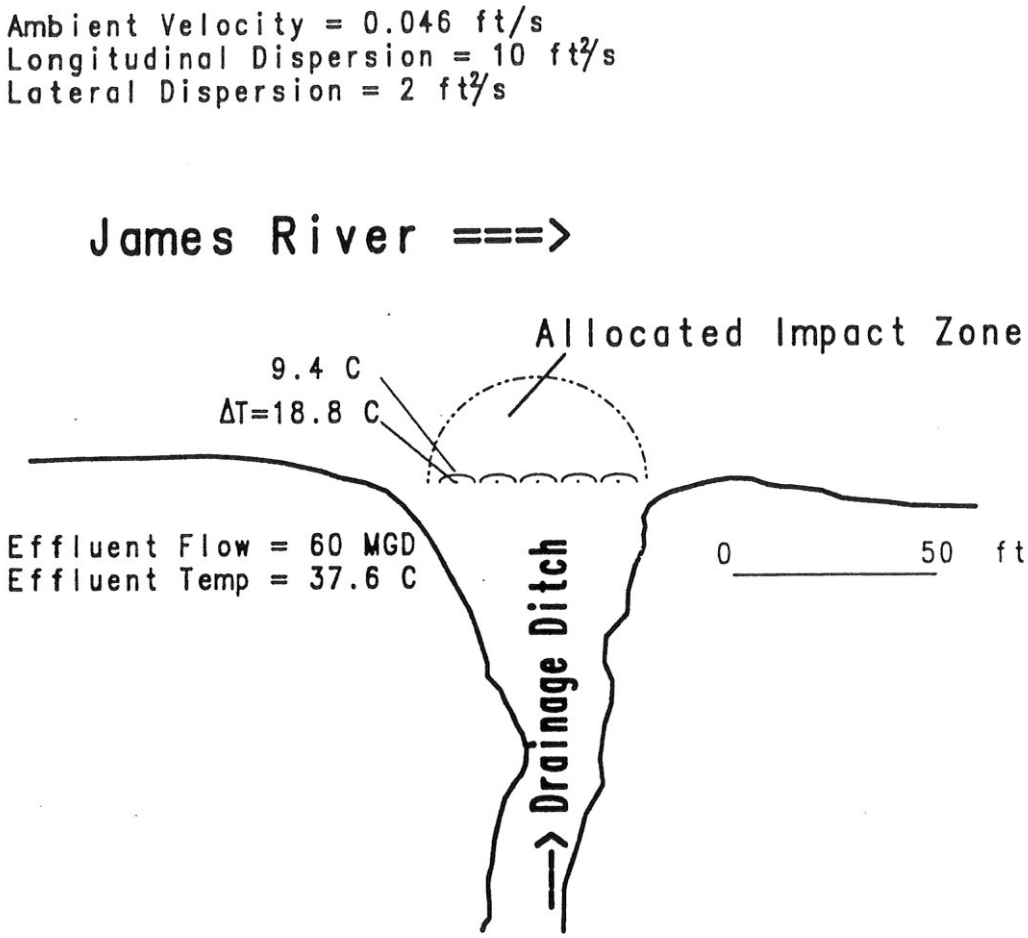

Figure A-3. Model Calculated ΔT Isopleths in Allocated Impact Zone with Temperature in the Effluent = 37.6°C (60 MGD)

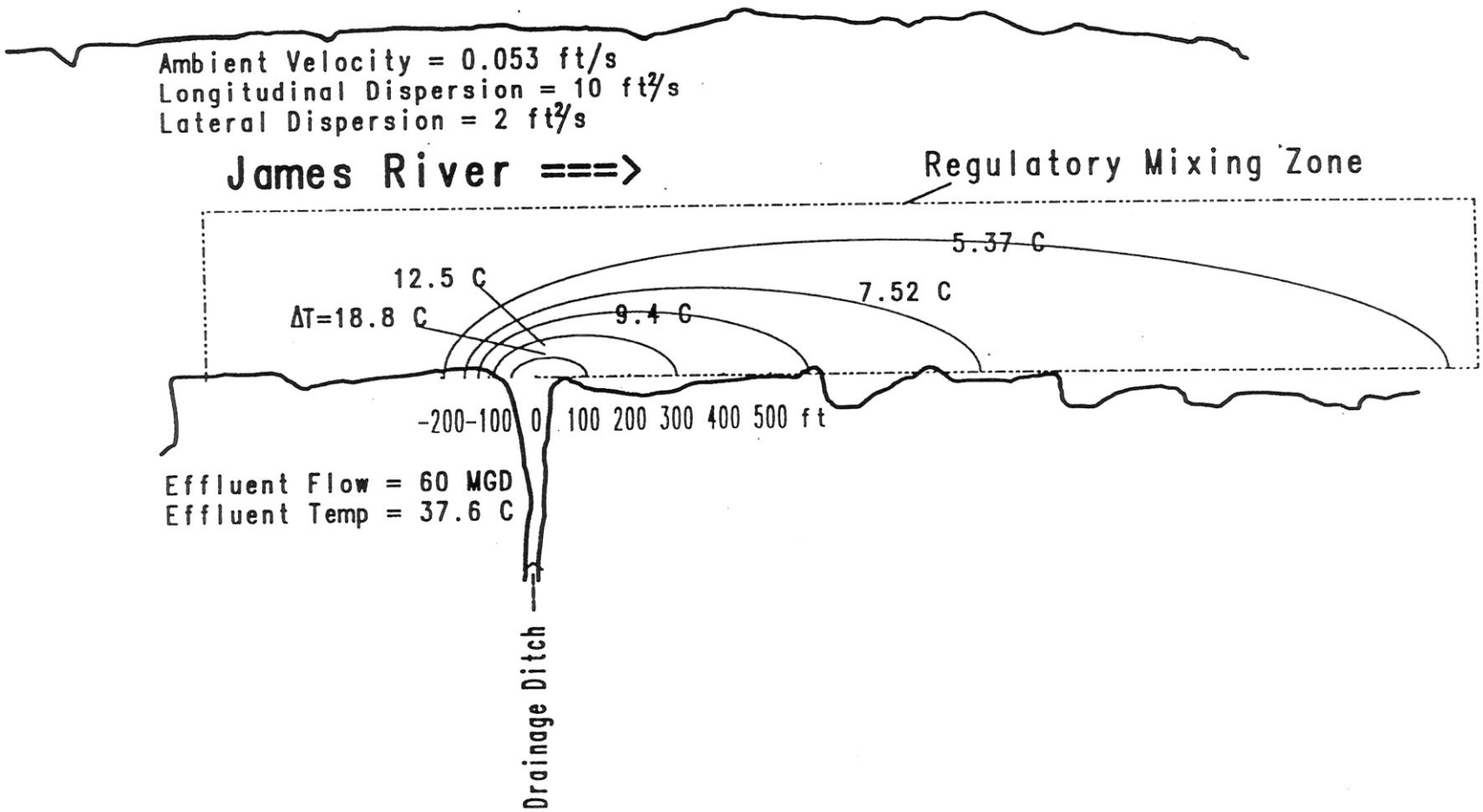

Figure A-4. Model Calculated ΔT Isopleths in Regulatory Mixing Zone with Temperature in the Effluent = 37.6°C (60 MGD)

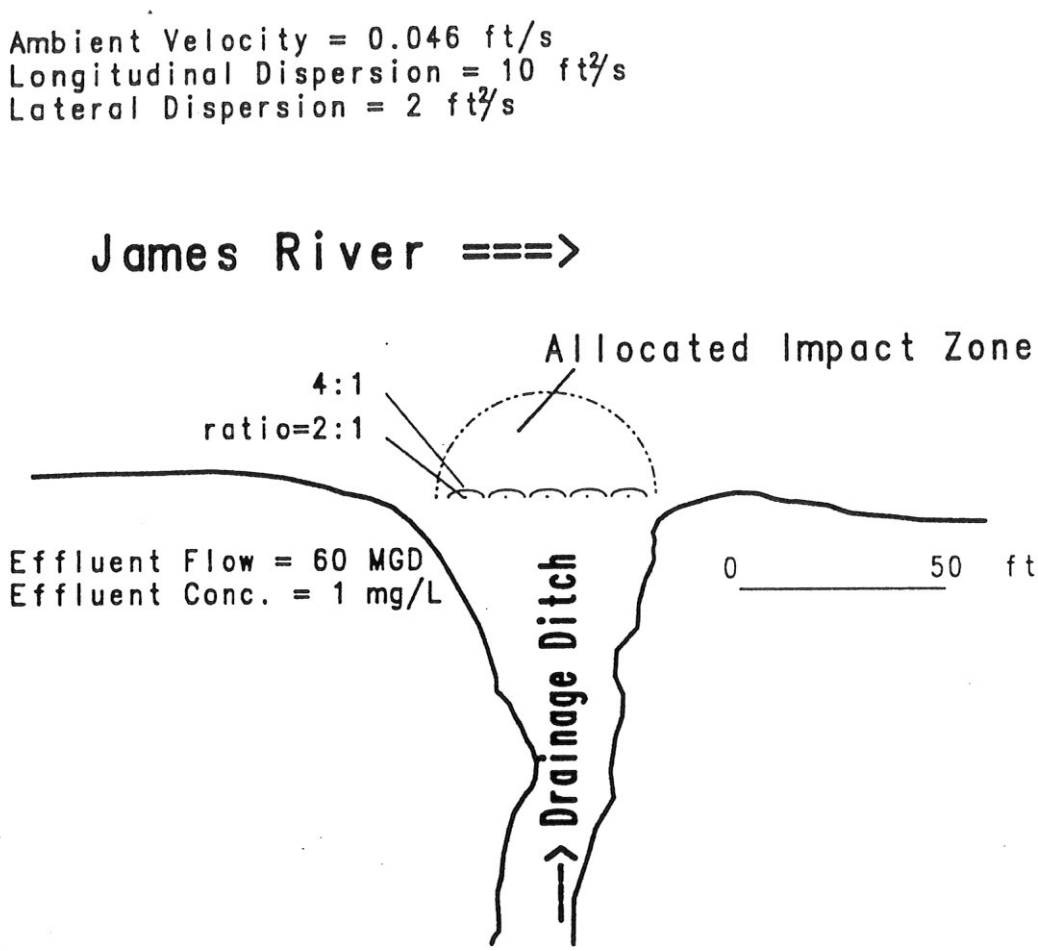

Figure A-5. Model Calculated Dilution Ratios in Allocated Impact Zone (60 MGD)

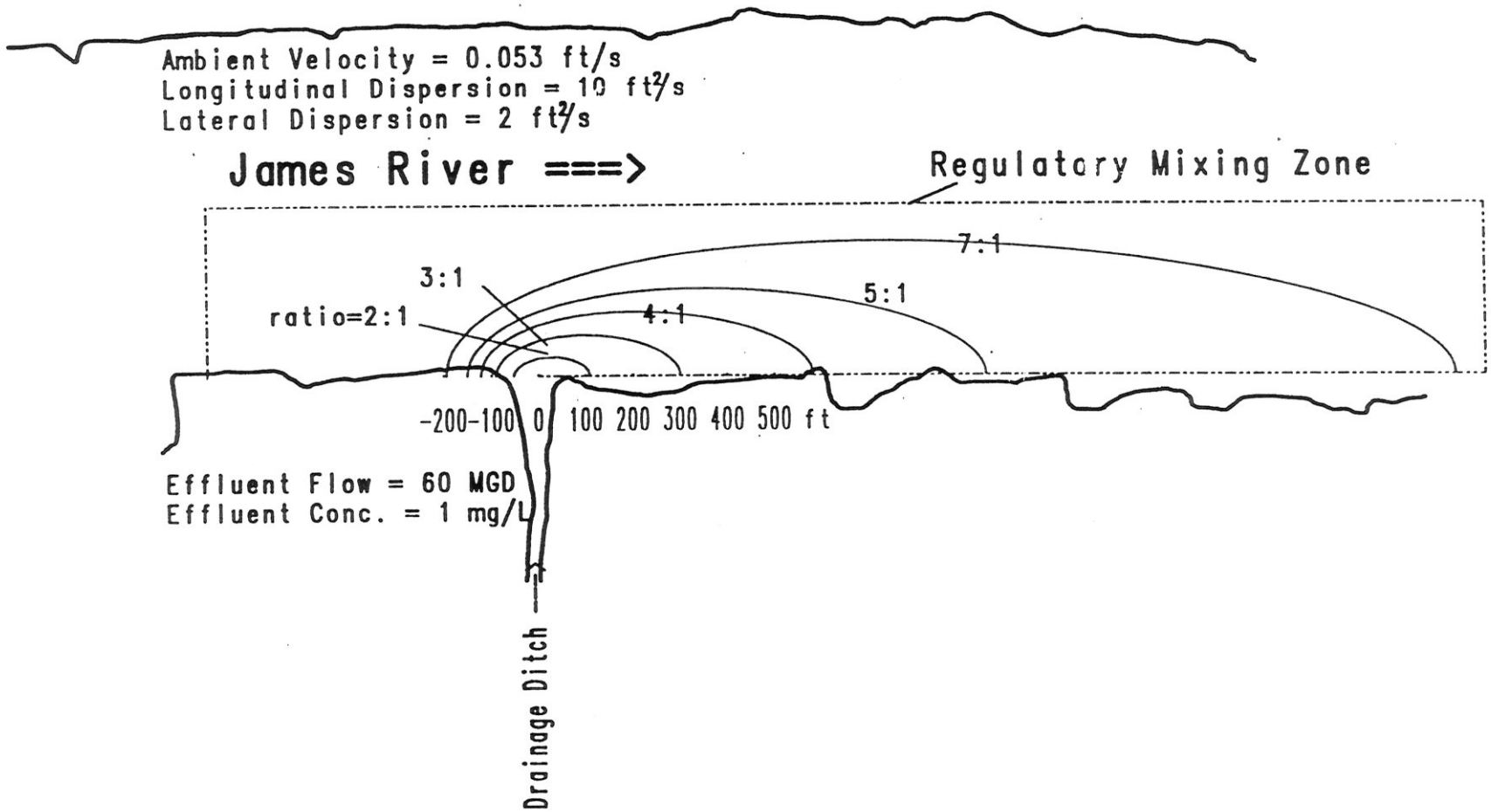

Figure A-6. Model Calculated Dilution Ratios in Regulatory Mixing Zone (60 MGD)

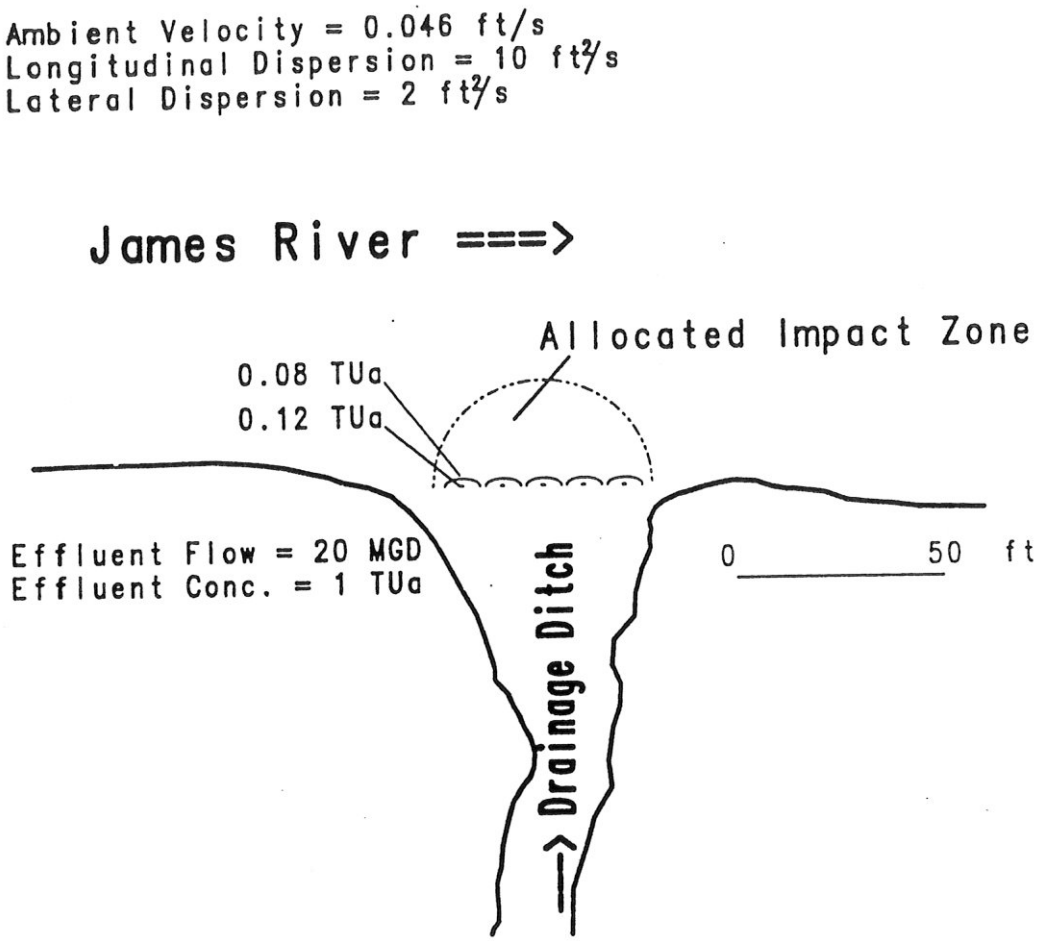

Figure A-7. Model Calculated Isopleths with Acute Toxicity in the Effluent = 1 TU_a (20 MGD)

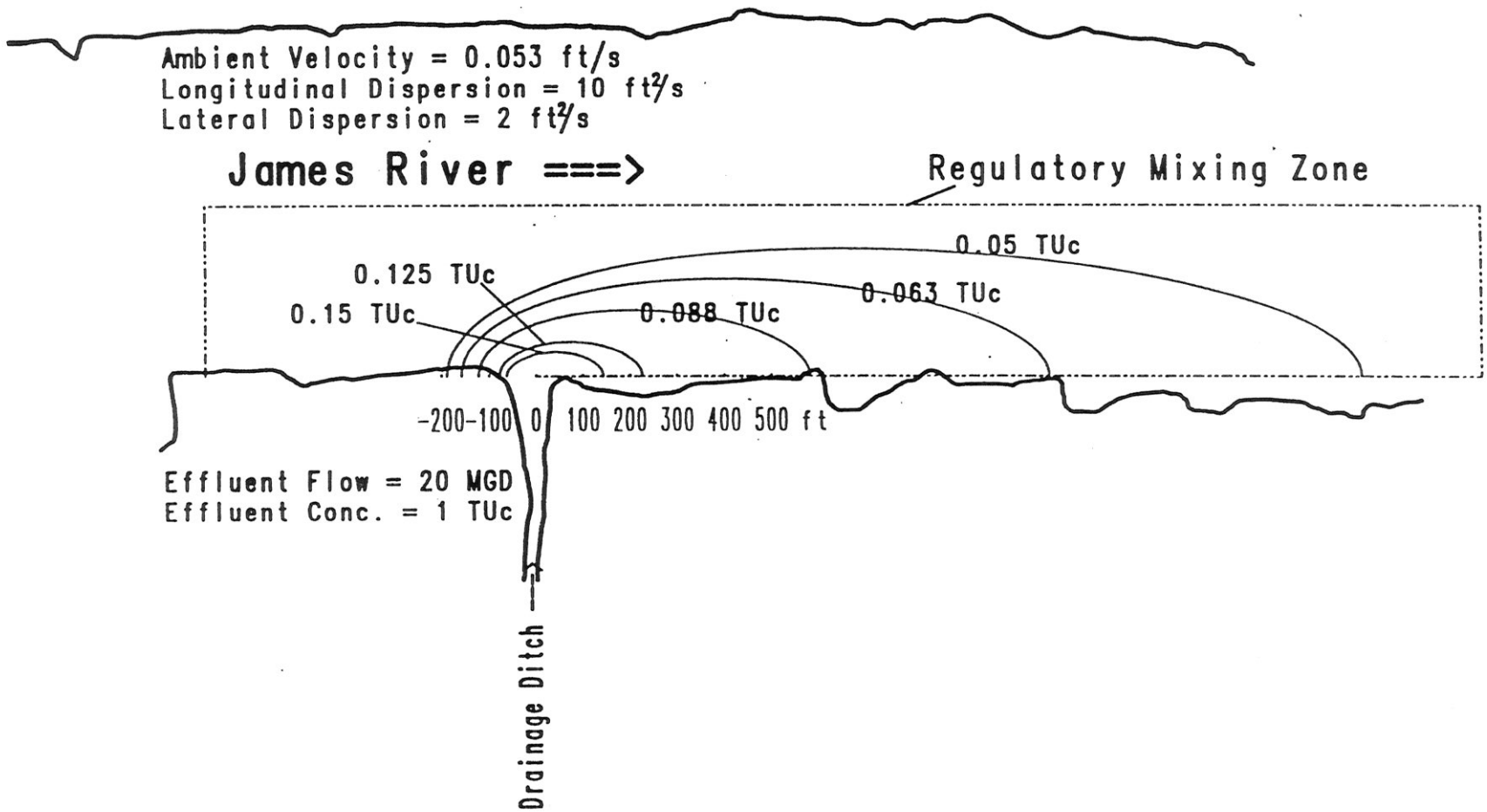

Figure A-8. Model Calculated Isopleths with Chronic Toxicity in the Effluent = 1 TU_c (20 MGD)

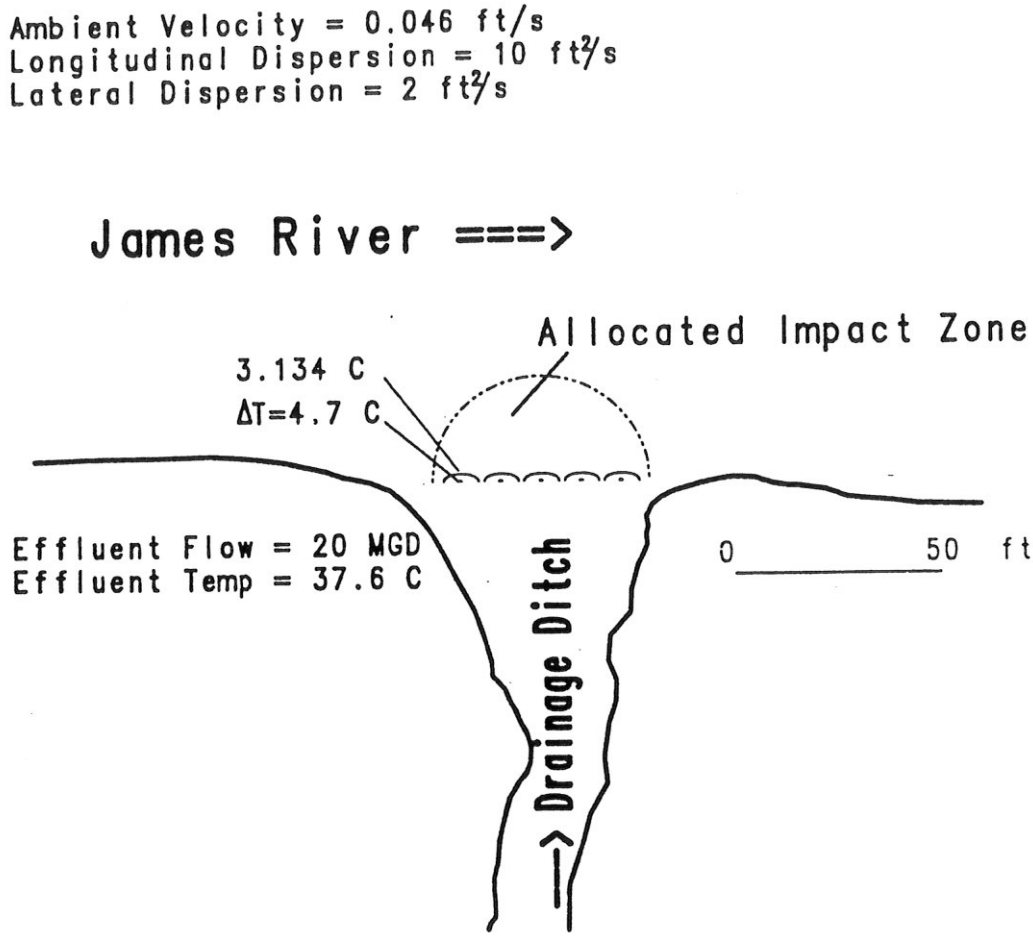

Figure A-9. Model Calculated ΔT Isopleths in Allocated Impact Zone with Temperature in the Effluent = 37.6°C (20 MGD)

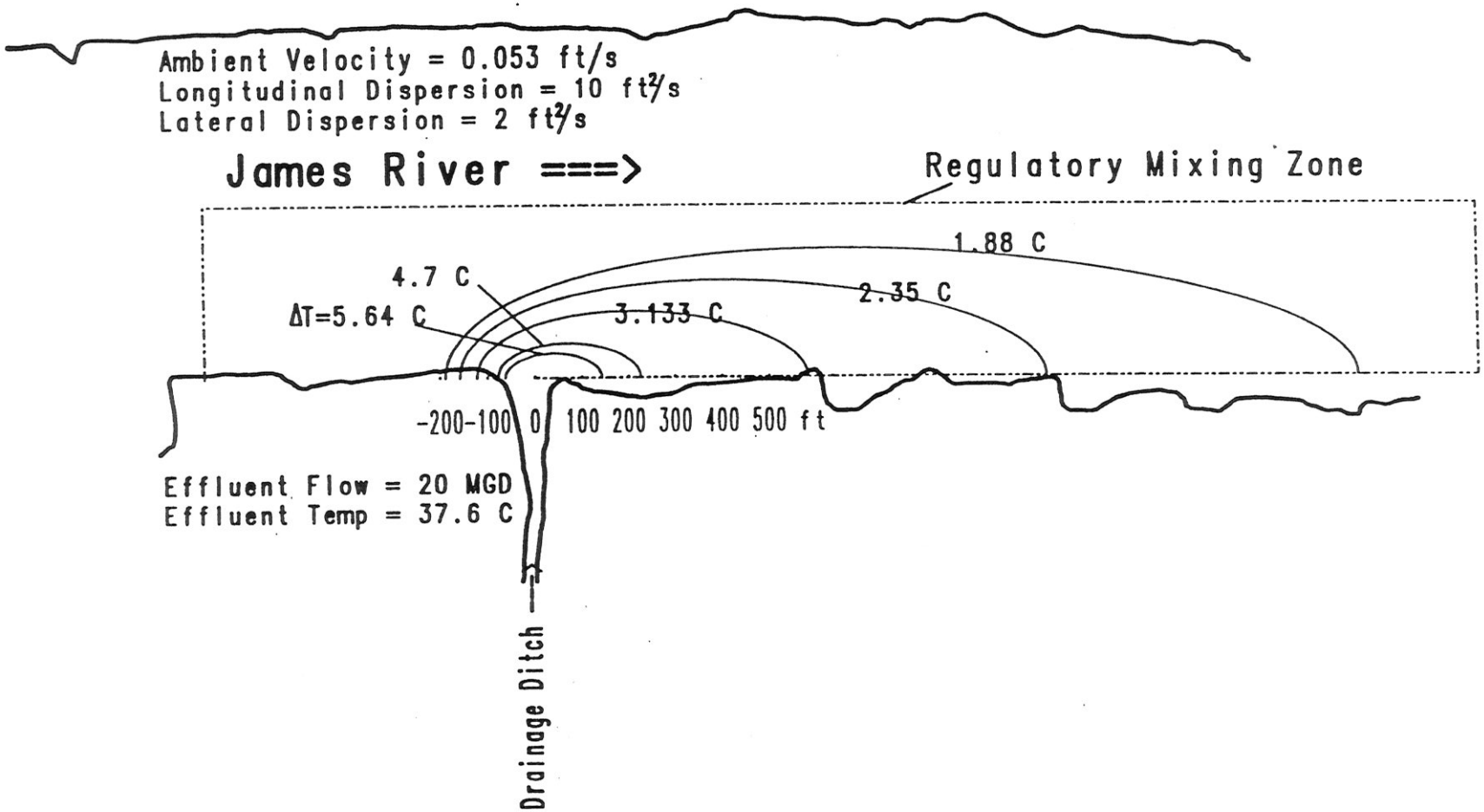

Figure A-10. Model Calculated ΔT Isopleths in Regulatory Mixing Zone with Temperature in the Effluent = 37.6°C (20 MGD)

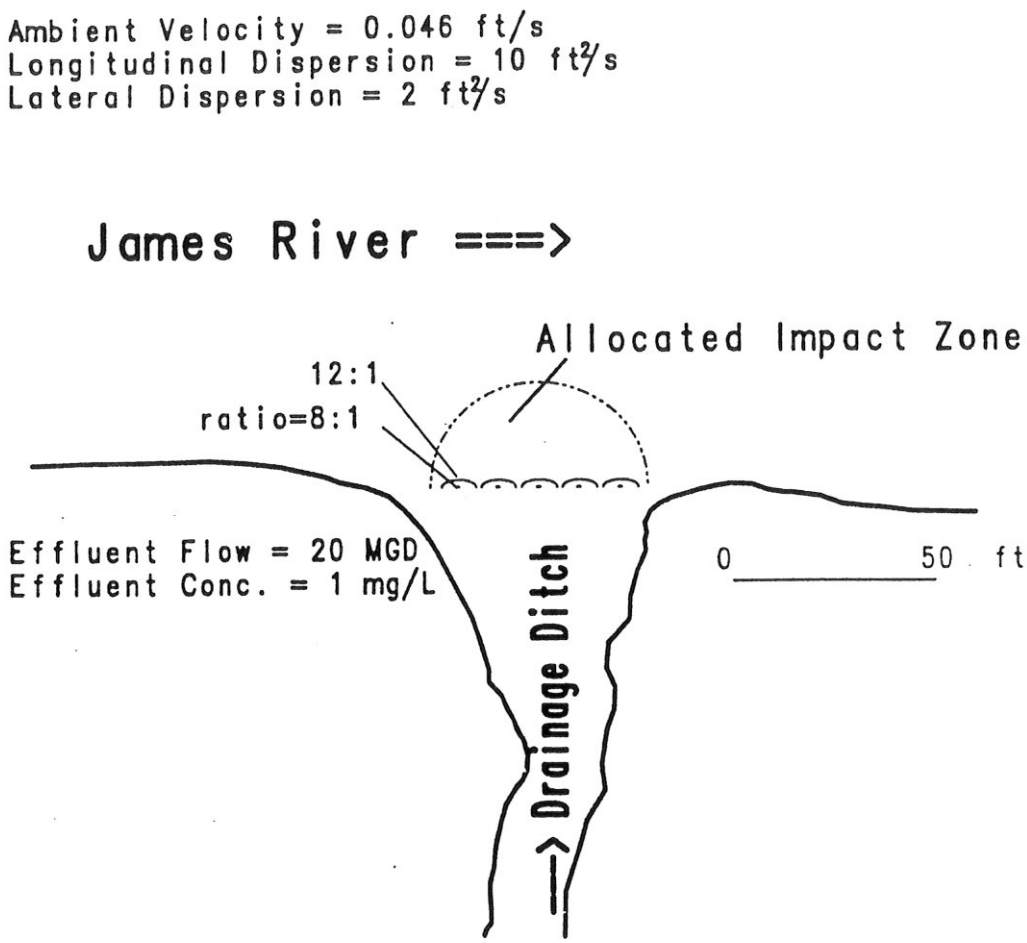

Figure A-11. Model Calculated Dilution Ratios in Allocated Impact Zone (20 MGD)

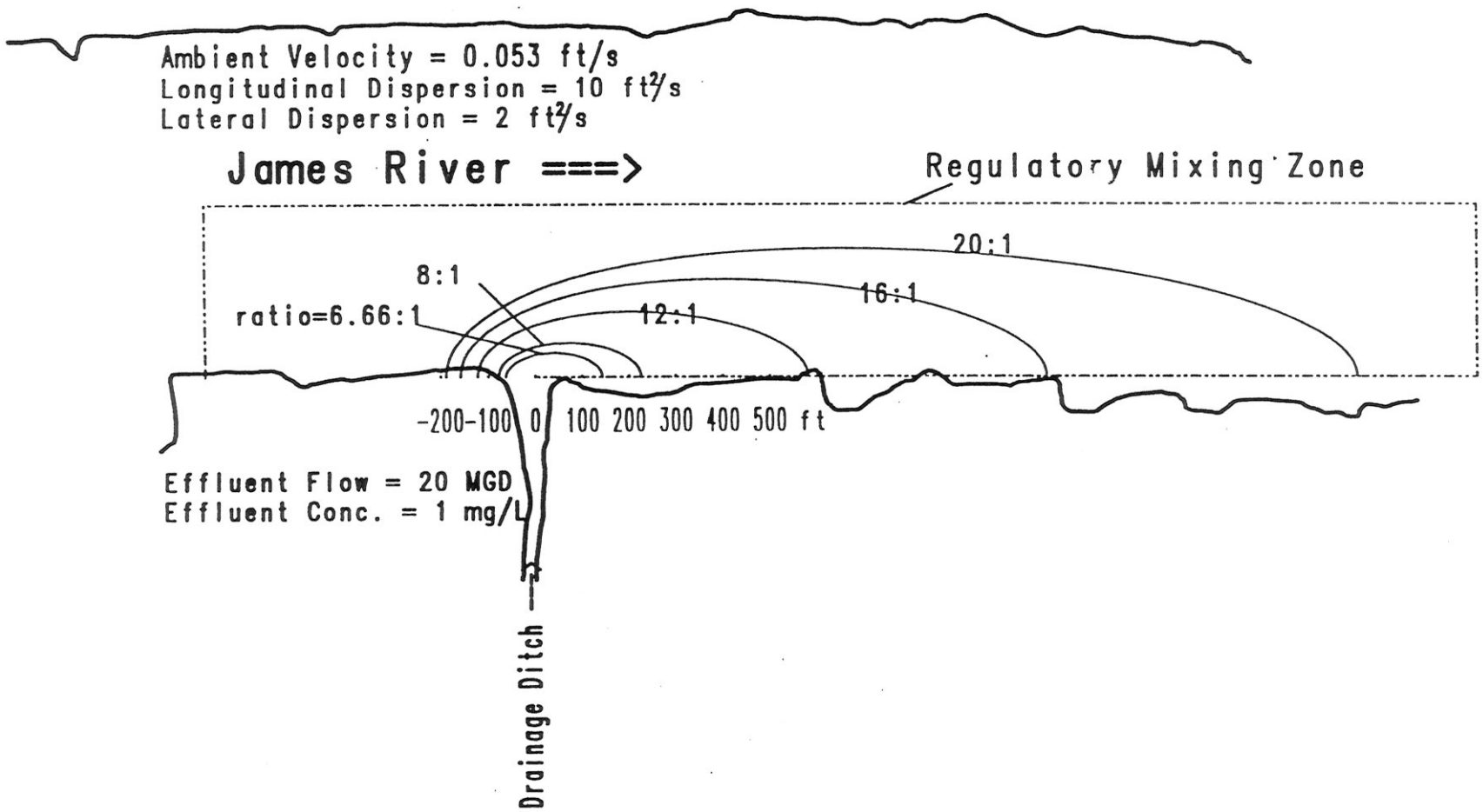

Figure A-11. Model Calculated Dilution Ratios in Regulatory Mixing Zone (20 MGD)

Attachment F

Selected Effluent Data

Outfall 001 DMR Data

Due Date	Daily Maximum (MGD)	30-D Avg Flow (MGD)	Minimum pH (SU)	Maximum pH (SU)	Maximum TRC (mg/L)	Maximum TP (mg/L)	Maximum TN (mg/L)
10-Jun-06	39.57	31.7	6.5	7.7	<QL	0.16	2.7
10-Jul-06	43.11	38.89	6.7	8.2	<QL	0.2	2.12
10-Aug-06	53.83	43.67	6.9	8.4	<QL	0.2	1.74
10-Sep-06	49.05	42.42	7.2	8	<QL	0.2	2.03
10-Oct-06	68.12	35.93	6.8	8.7	<QL	0.2	2.21
10-Nov-06	54.9	29.72	6.5	8	<QL	0.2	2
10-Dec-06	29.98	18.08	6.2	7.8	<QL	0.2	3.92
10-Jan-07	15.81	13.88	6.9	8.4	<QL	0.2	4.22
10-Feb-07	26.95	14.54	6.6	8.3	<QL	0.2	5.12
10-Mar-07	17.36	13.04	6.2	7.7	<QL	0.2	8.27
10-Apr-07	28.38	16.68	6.8	8.2	<QL	0.2	5.65
10-May-07	35.57	23.31	6.8	8	<QL	0.1	5.45
10-Jun-07	37.32	32.99	7	7.9	<QL	0.08	2.47
10-Jul-07	44.89	37.71	6.8	7.6	<QL	0.11	3.57
10-Aug-07	43.77	38.58	6.8	7.9	0.06	0.1	2.33
10-Sep-07	53.11	42.52	6.8	7.8	0.06	0.2	3.26
10-Oct-07	43.62	39.48	6.9	7.7	0.04	0.2	4.05
10-Nov-07	41.04	35.27	6.5	7.9	<QL	0.2	3.97
10-Dec-07	27.49	22.78	6.5	7.6	<QL	0.3	3.97
10-Jan-08	25.49	16.82	6.8	7.6	<QL	<0.25	5.2
10-Feb-08	23.57	17.07	6.6	7.4	<QL	0.37	4.6
10-Mar-08	18.96	15.12	6.5	7.6	<QL	0.19	5.57
10-Apr-08	31.5	25.74	6.8	8.3	<QL	0.15	4.58
10-May-08	47.88	30.74	6.6	7.7	<QL	0.11	1
10-Jun-08	56.86	38.41	6.6	7.6	<QL	0.17	3.5
Average	**38.3252**	**28.6036**	**6.692**	**7.92**	**<QL**	**0.19**	**3.74**
Maximum	**68.12**	**43.67**	**7.2**	**8.7**	**<QL**	**0.37**	**8.27**
90th%	**54.472**	**41.244**	**6.9**	**8.36**	**<QL**	**0.23**	**5.522**
10th%	**20.80**	**14.77**	**6.50**	**7.60**	**<QL**	**0.10**	**2.01**

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DuPont - Spruance

Outfall 001 DMR Data

Due Date	Maximum NH_3	Max. Temperature	Maximum $cBOD_5$	Minimum DO
	(mg/L)	(°F)	(mg/L)	(mg/L)
10-Jun-06	0.45	97.1	2.5	6.6
10-Jul-06	0.65	100	2.8	6.1
10-Aug-06	0.39	101.9	<2.0	5.9
10-Sep-06	0.46	102.1	2.2	6.1
10-Oct-06	0.43	92	<2.0	6.5
10-Nov-06	0.41	91	2.2	7.1
10-Dec-06	0.71	78.4	3.9	8.4
10-Jan-07	1.37	81.2	3.3	8.6
10-Feb-07	1.4	71	4.9	9.2
10-Mar-07	2.9	65.5	6.4	11
10-Apr-07	0.24	85.9	4.5	8.9
10-May-07	1.13	88	10.4	7.4
10-Jun-07	0.85	99.8	2.5	6.4
10-Jul-07	0.03	98.3	4.6	5.9
10-Aug-07	0.47	98.2	<2	6.1
10-Sep-07	0.57	101.7	2.7	5.8
10-Oct-07	0.68	96.6	2.2	6
10-Nov-07	1.2	94	2.2	6.2
10-Dec-07	1.06	80.4	3	7.9
10-Jan-08	2.29	78.5	6.2	9.3
10-Feb-08	1.65	72	3.4	10.2
10-Mar-08	2.85	73.7	>58.8	10.2
10-Apr-08	0.89	79.4	5	8.3
10-May-08	1	85	6.5	7.5
10-Jun-08	0.67	89.1	5.5	8.1
Average	**0.99**	**88.032**	**5.828**	**7.588**
Maximum	**2.9**	**102.1**	**58.8**	**11**
90th%	**2.034**	**101.02**	**6.46**	**9.84**
10th%	**0.40**	**72.68**	**0.88**	**5.94**

Hardness Data from WET Tests and WQS Testing

Date	mg/L as $CaCO_3$
6/11/2006	580
6/12/2006	600
6/13/2006	560
6/14/2006	660
6/15/2006	520
6/10/2007	404
6/11/2007	672
6/12/2007	684
6/13/2007	664
6/14/2007	612
6/15/2008	556
6/16/2008	696
6/17/2008	616
6/18/2008	544
6/19/2008	572
WQS test	1100
Average	**627.5**

Fact Sheet
DuPont - Spruance

Outfall 101 DMR Data

Date	Mo. Avg.Flow (MGD)	Maximum Flow (MGD)	Maximum TSS (mg/L)	Maximum NH_3 (mg/L)	Bis (2-ethylhexyl) phthalate (mg/L)
10-Jun-06	4.79	11.17	61.4	9.48	
10-Jul-06	4.78	8.09	54.5	8.45	
10-Aug-06	5.33	8.35	37.6	5.35	
10-Sep-06	5.06	8.01	66	7.8	
10-Oct-06	5.73	17.96	55.9	5.9	
10-Nov-06	6.29	13.62	43.9	5.4	
10-Dec-06	5.72	7.82	41	7.4	
10-Jan-07	4.17	5.07	53.1	9.7	
10-Feb-07	5.09	7.95	50	5.8	
10-Mar-07	5.07	7.53	50	11.7	
10-Apr-07	4.94	8.62	57.1	8.3	
10-May-07	5	7.99	44.7	8.1	38
10-Jun-07	4.49	5.53	43.7	7.4	
10-Jul-07	5.08	5.9	40.6	5.8	
10-Aug-07	5.32	7.66	43.3	7.6	
10-Sep-07	6.99	16.45	33.1	6.5	
10-Oct-07	5.89	7.03	44.1	9	
10-Nov-07	5.7	9	38.7	9.4	
10-Dec-07	4.25	6.51	43	8.9	
10-Jan-08	4.82	6.6	38.5	7.9	
10-Feb-08	4.76	6.67	30.6	8.4	
10-Mar-08	4.88	5.48	37	9.8	
10-Apr-08	5.36	6.53	42.6	7.8	
10-May-08	5.56	11.6	32.4	8.35	
10-Jun-08	5.4	12.02	38	5.6	

Outfall 101 DMR Data

Date	Max. $cBOD_5$ (mg/L)	Max. HMPA (mg/L)	Max. TR Ni (mg/L)	Max. TR Zn (mg/L)
10-Jun-06	11.8	0.2	0.03	0.01
10-Jul-06	10.6	0.1		
10-Aug-06	12.2	0.5		
10-Sep-06	12.6	0.3	0.03	0.01
10-Oct-06	8.5	0.3		
10-Nov-06	9.3	0.2		
10-Dec-06	18	0.2	0.02	<0.01
10-Jan-07	13.2	0.2		
10-Feb-07	9.1	0.5		
10-Mar-07	15.2	0.5		
10-Apr-07	14.6	0.4	0.04	0.02
10-May-07	16.2	0.6	0.01	<0.01
10-Jun-07	10.8	0.3	0.01	<0.01
10-Jul-07	10.2	0.5		
10-Aug-07	10.8	0.3		
10-Sep-07	10.8	0.7	NR	NR
10-Oct-07	9	0.5		
10-Nov-07	8.4	0.5		
10-Dec-07	9.8	0.3	0.02	<0.02
10-Jan-08	11.9	0.8		
10-Feb-08	13.6	0.5		
10-Mar-08	11.7	0.8	0.05	<0.02
10-Apr-08	13.1	0.4		
10-May-08	<5.0	0.3		
10-Jun-08	8.8	1.2	0.02	0.01

All other parameters reported on the DMRs were reported as <QL for the monitoring period of May 2006-May 2008.

Fact Sheet
DuPont - Spruance

Outfall 102 DMR Data

Date	Max. Flow (MGD)	TSS (mg/L)
10-Jun-06	0.23	18
10-Jul-06	0.26	27.7
10-Aug-06	0.23	6.7
10-Sep-06	0.23	20.4
10-Oct-06	0.21	4.9
10-Nov-06	0.21	44
10-Dec-06	0.19	4.9
10-Jan-07	0.18	9.9
10-Feb-07	0.18	70
10-Mar-07	0.18	4.6
10-Apr-07	0.18	7.6
10-May-07	0.19	8
10-Jun-07	0.2	5.4
10-Jul-07	0.22	5.6
10-Aug-07	0.24	15.6
10-Sep-07	0.26	17.8
10-Oct-07	0.27	5.7
10-Nov-07	0.25	5
10-Dec-07	0.25	22.2
10-Jan-08	0.18	7.5
10-Feb-08	0.23	5
10-Mar-08	0.22	49.5
10-Apr-08	0.22	3.4
10-May-08	0.23	2
10-Jun-08	0.25	10.7

Outfall 103 DMR Data

Date	Maximum Flow (MGD)	Max. HMPA (mg/L)	Max. Chloroform (mg/L as $CHCl_3$)	Trichlorofluoro-methane (mg/L)	Max. Zinc (mg/L)
10-Jun-06	0.156	24	<0.0020	<2.0	0.36
10-Jul-06	0.16	<0.1	<0.002	<2.00	0.22
10-Aug-06	0.16	<0.1	<0.002	<2.00	0.29
10-Sep-06	0.16	<0.1	0.002	<2.00	0.31
10-Oct-06	0.2	<0.1	<0.002	<2.00	0.21
10-Nov-06	0.18	0.1	<0.002	3	0.23
10-Dec-06	0.17	1.8	<0.002	<2.00	0.04
10-Jan-07	0.16	<0.1	<0.002	<2.00	0.17
10-Feb-07	0.16	15.6	<0.002	<2.0	0.18
10-Mar-07	0.14	<0.1	<0.002	<2.00	0.41
10-Apr-07	0.18	<0.1	<0.002	<2.00	0.05
10-May-07	0.17	160	<0.002	<2.0	0.41
10-Jun-07	0.17	<0.1	<0.002	2	0.48
10-Jul-07	0.17	<0.1	0.003	<2.00	0.37
10-Aug-07	0.17	<.1	0.004	<2.0	0.2
10-Sep-07	0.16	0.4	0.003	<2.00	0.21
10-Oct-07	0.16	<0.1	0.004	<2.00	0.19
10-Nov-07	0.2	0.1	<0.002	<2.0	0.4
10-Dec-07	0.2	<0.1	<0.002	<2	0.72
10-Jan-08	0.19	<0.1	<0.002	<2.00	0.7
10-Feb-08	0.19	0.2	<0.002	<2.0	0.87
10-Mar-08	0.18	<0.1	<0.002	<0.002	0.7
10-Apr-08	0.2	<0.1	<0.002	<2.00	0.62
10-May-08	0.18	0.2	<0.002	<2.0	0.63
10-Jun-08	0.19	<0.1	<0.002	<2.00	0.76

All other parameters reported on the DMRs were reported as <QL for the monitoring period of May 2006-May 2008.

Attachment G

Effluent Limitations Evaluations for Outfalls 001 and 103

For the purposes of this evaluation, all parameters with data reported as less than the quantification limit were considered absent in the discharge.

MSTRANTI Data Source Summary

Stream Information	
Mean Hardness	2-JMS104.16 (Attachment C)
90% Temperature	2-JMS104.16 (Attachment C)
90% Maximum pH	2-JMS104.16 (Attachment C)
10% Maximum pH	2-JMS104.16 (Attachment C)
Tier Designation	Tier determination (Tier 1)
Stream Flows	
All Data	Mixing Zone Model (Attachment E)
Mixing Information	
All Data	Set at 100% to reflect the use of mixing ratios
Effluent Information	
Mean Hardness	WET Test Data submitted from 2006- 2008 and WQS testing data (Attachment F)
90% Temperature	Set equal to the daily maximum limitation of 40.0 °C (104 °F)
90% Maximum pH	Effluent Data (DMRs) (Attachment F)
10% Maximum pH	Effluent Data (DMRs) (Attachment F)
Discharge Flow	MSTRANTI used for theoretical ammonia evaluation: Long Term Average (from DMRs) MSTRANTI used for all other evaluations: Maximum 30-day average (DMRs) (Attachment F);

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: DuPont- Spruance Permit No.: VA0004669

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

Stream Information

Mean Hardness (as CaCO3) =	63.6	mg/L
90% Temperature (Annual) =	28.6	deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =	7.9	SU
10% Maximum pH =	7.3	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	131.01	MGD
7Q10 (Annual) =	262.02	MGD
30Q10 (Annual) =	262.02	MGD
1Q10 (Wet season) =		MGD
30Q10 (Wet season) =		MGD
30Q5 =	262.02	MGD
Harmonic Mean =	262.02	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) =	627.5	mg/L
90% Temp (Annual) =	40	deg C
90% Temp (Wet season) =		deg C
90% Maximum pH =	8.36	SU
10% Maximum pH =	7.6	SU
Discharge Flow =	43.67	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	**1.9E+04**
Acrolein	0	--	--	na	7.8E+02	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	--	--	na	**5.5E+03**
Acrylonitrile[C]	0	--	--	na	6.6E+00	--	--	na	4.6E+01	--	--	--	--	--	--	--	--	--	--	na	**4.6E+01**
Aldrin [C]	0	3.0E+00	--	na	1.4E-03	1.2E+01	--	na	9.8E-03	--	--	--	--	--	--	--	--	**1.2E+01**	--	na	**9.8E-03**
Ammonia-N (mg/l) (Yearly)	0	8.77E+00	9.59E-01	na	--	3.5E+01	6.7E+00	na	--	--	--	--	--	--	--	--	--	**3.5E+01**	**6.7E+00**	na	--
Ammonia-N (mg/l) (High Flow)	0	4.20E+00	1.38E+00	na	--	4.2E+00	1.4E+00	na	--	--	--	--	--	--	--	--	--	**4.2E+00**	**1.4E+00**	na	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	7.7E+05	--	--	--	--	--	--	--	--	--	--	na	**7.7E+05**
Antimony	0	--	--	na	4.3E+03	--	--	na	3.0E+04	--	--	--	--	--	--	--	--	--	--	na	**3.0E+04**
Arsenic	o	3.4E+02	1.5E+02	na	--	1.4E+03	1.1E+03	na	--	--	--	--	--	--	--	--	--	**1.4E+03**	**1.1E+03**	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	7.1E+02	--	--	na	5.0E+03	--	--	--	--	--	--	--	--	--	--	na	**5.0E+03**
Benzidine[C]	0	--	--	na	5.4E-03	--	--	na	3.8E-02	--	--	--	--	--	--	--	--	--	--	na	**3.8E-02**
Benzo (a) anthracene [C]	0	--	--	na	4.9E-01	--	--	na	3.4E+00	--	--	--	--	--	--	--	--	--	--	na	**3.4E+00**
Benzo (b) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	3.4E+00	--	--	--	--	--	--	--	--	--	--	na	**3.4E+00**
Benzo (k) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	3.4E+00	--	--	--	--	--	--	--	--	--	--	na	**3.4E+00**
Benzo (a) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	3.4E+00	--	--	--	--	--	--	--	--	--	--	na	**3.4E+00**
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	9.8E+01	--	--	--	--	--	--	--	--	--	--	na	**9.8E+01**
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.2E+06	--	--	--	--	--	--	--	--	--	--	na	**1.2E+06**
Bromoform [C]	0	--	--	na	3.6E+03	--	--	na	2.5E+04	--	--	--	--	--	--	--	--	--	--	na	**2.5E+04**
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	3.6E+04	--	--	--	--	--	--	--	--	--	--	na	**3.6E+04**
Cadmium	0	8.8E+00	1.5E+00	na	--	3.5E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**3.5E+01**	**1.1E+01**	na	--
Carbon Tetrachloride [C]	0	--	--	na	4.4E+01	--	--	na	3.1E+02	--	--	--	--	--	--	--	--	--	--	na	**3.1E+02**
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	9.6E+00	3.0E-02	na	1.5E-01	--	--	--	--	--	--	--	--	**9.6E+00**	**3.0E-02**	na	**1.5E-01**
Chloride	0	8.6E+05	2.3E+05	na	--	3.4E+06	1.6E+06	na	--	--	--	--	--	--	--	--	--	**3.4E+06**	**1.6E+06**	na	--
TRC	0	1.9E+01	1.1E+01	na	--	7.6E+01	7.7E+01	na	--	--	--	--	--	--	--	--	--	**7.6E+01**	**7.7E+01**	na	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	1.5E+05	--	--	--	--	--	--	--	--	--	--	na	**1.5E+05**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	2.4E+03	--	--	--	--	--	--	--	--	--	--	na	2.4E+03
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	3.0E+04	--	--	--	--	--	--	--	--	--	--	na	3.0E+04
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	3.3E-01	2.9E-01	na	--	--	--	--	--	--	--	--	--	3.3E-01	2.9E-01	na	--
Chromium III	0	1.0E+03	1.0E+02	na	--	4.1E+03	7.0E+02	na	--	--	--	--	--	--	--	--	--	4.1E+03	7.0E+02	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	6.4E+01	7.7E+01	na	--	--	--	--	--	--	--	--	--	6.4E+01	7.7E+01	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	3.4E+00	--	--	--	--	--	--	--	--	--	--	na	3.4E+00
Copper	0	2.6E+01	1.2E+01	na	--	1.1E+02	8.6E+01	na	--	--	--	--	--	--	--	--	--	1.1E+02	8.6E+01	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	8.8E+01	3.6E+01	na	1.5E+06	--	--	--	--	--	--	--	--	8.8E+01	3.6E+01	na	1.5E+06
DDD [C]	0	--	--	na	8.4E-03	--	--	na	5.9E-02	--	--	--	--	--	--	--	--	--	--	na	5.9E-02
DDE [C]	0	--	--	na	5.9E-03	--	--	na	4.1E-02	--	--	--	--	--	--	--	--	--	--	na	4.1E-02
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	4.4E+00	7.0E-03	na	4.1E-02	--	--	--	--	--	--	--	--	4.4E+00	7.0E-03	na	4.1E-02
Demeton	0	--	1.0E-01	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	3.4E+00	--	--	--	--	--	--	--	--	--	--	na	3.4E+00
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	8.4E+04	--	--	--	--	--	--	--	--	--	--	na	8.4E+04
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	--	--	na	1.1E+05
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	na	1.2E+05
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	5.4E+00	--	--	--	--	--	--	--	--	--	--	na	5.4E+00
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	3.2E+03	--	--	--	--	--	--	--	--	--	--	na	3.2E+03
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	6.9E+03	--	--	--	--	--	--	--	--	--	--	na	6.9E+03
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	na	1.2E+05
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	9.8E+05	--	--	--	--	--	--	--	--	--	--	na	9.8E+05
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	--	--	na	5.5E+03
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	--	--	na	2.7E+03
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	9.6E-01	3.9E-01	na	9.8E-03	--	--	--	--	--	--	--	--	9.6E-01	3.9E-01	na	9.8E-03
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	8.4E+05	--	--	--	--	--	--	--	--	--	--	na	8.4E+05
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	4.1E+02	--	--	--	--	--	--	--	--	--	--	na	4.1E+02
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	--	--	na	1.6E+04
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	2.0E+07	--	--	--	--	--	--	--	--	--	--	na	2.0E+07
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	8.4E+04	--	--	--	--	--	--	--	--	--	--	na	8.4E+04
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	9.8E+04	--	--	--	--	--	--	--	--	--	--	na	9.8E+04
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	5.4E+03	--	--	--	--	--	--	--	--	--	--	na	5.4E+03
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	6.4E+02	--	--	--	--	--	--	--	--	--	--	na	6.4E+02
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	--	--	na	na
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	3.8E+01	--	--	--	--	--	--	--	--	--	--	na	3.8E+01
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	8.8E-01	3.9E-01	na	1.7E+03	--	--	--	--	--	--	--	--	8.8E-01	3.9E-01	na	1.7E+03
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	8.8E-01	3.9E-01	na	1.7E+03	--	--	--	--	--	--	--	--	8.8E-01	3.9E-01	na	1.7E+03
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	3.4E-01	2.5E-01	na	5.7E+00	--	--	--	--	--	--	--	--	3.4E-01	2.5E-01	na	5.7E+00
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	5.7E+00	--	--	--	--	--	--	--	--	--	--	na	5.7E+00

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+05**
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+03**
Fluorene	0	--	--	na	1.4E+04	--	--	na	9.8E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.8E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	7.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**7.0E-02**	**na**	**--**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	2.1E+00	2.7E-02	na	1.5E-02	--	--	--	--	--	--	--	--	**2.1E+00**	**2.7E-02**	**na**	**1.5E-02**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	2.1E+00	2.7E-02	na	7.7E-03	--	--	--	--	--	--	--	--	**2.1E+00**	**2.7E-02**	**na**	**7.7E-03**
Hexachlorobenzene[C]	0	--	--	na	7.7E-03	--	--	na	5.4E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E-02**
Hexachlorobutadiene[C]	0	--	--	na	5.0E+02	--	--	na	3.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.5E+03**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	1.3E-01	--	--	na	9.1E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.1E-01**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	4.6E-01	--	--	na	3.2E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+00**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	3.8E+00	--	na	4.4E+00	--	--	--	--	--	--	--	--	**3.8E+00**	**--**	**na**	**4.4E+00**
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**
Hexachloroethane[C]	0	--	--	na	8.9E+01	--	--	na	6.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.2E+02**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	1.4E+01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E+01**	**na**	**--**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	3.4E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+00**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Isophorone[C]	0	--	--	na	2.6E+04	--	--	na	1.8E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+05**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	3.0E+02	2.2E+01	na	--	1.2E+03	1.5E+02	na	--	--	--	--	--	--	--	--	--	**1.2E+03**	**1.5E+02**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**7.0E-01**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	5.6E+00	5.4E+00	na	3.6E-01	--	--	--	--	--	--	--	--	**5.6E+00**	**5.4E+00**	**na**	**3.6E-01**
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	2.8E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.8E+04**
Methoxychlor	0	--	3.0E-02	na	--	--	2.1E-01	na	--	--	--	--	--	--	--	--	--	**--**	**2.1E-01**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	1.5E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+05**
Nickel	0	3.3E+02	2.8E+01	na	4.6E+03	1.3E+03	1.9E+02	na	3.2E+04	--	--	--	--	--	--	--	--	**1.3E+03**	**1.9E+02**	**na**	**3.2E+04**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+04**
N-Nitrosodimethylamine[C]	0	--	--	na	8.1E+01	--	--	na	5.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.7E+02**
N-Nitrosodiphenylamine[C]	0	--	--	na	1.6E+02	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+03**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	1.4E+01	--	--	na	9.8E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.8E+01**
Parathion	0	6.5E-02	1.3E-02	na	--	2.6E-01	9.1E-02	na	--	--	--	--	--	--	--	--	--	**2.6E-01**	**9.1E-02**	**na**	**--**
PCB-1016	0	--	1.4E-02	na	--	--	9.8E-02	na	--	--	--	--	--	--	--	--	--	**--**	**9.8E-02**	**na**	**--**
PCB-1221	0	--	1.4E-02	na	--	--	9.8E-02	na	--	--	--	--	--	--	--	--	--	**--**	**9.8E-02**	**na**	**--**
PCB-1232	0	--	1.4E-02	na	--	--	9.8E-02	na	--	--	--	--	--	--	--	--	--	**--**	**9.8E-02**	**na**	**--**
PCB-1242	0	--	1.4E-02	na	--	--	9.8E-02	na	--	--	--	--	--	--	--	--	--	**--**	**9.8E-02**	**na**	**--**
PCB-1248	0	--	1.4E-02	na	--	--	9.8E-02	na	--	--	--	--	--	--	--	--	--	**--**	**9.8E-02**	**na**	**--**
PCB-1254	0	--	1.4E-02	na	--	--	9.8E-02	na	--	--	--	--	--	--	--	--	--	**--**	**9.8E-02**	**na**	**--**
PCB-1260	0	--	1.4E-02	na	--	--	9.8E-02	na	--	--	--	--	--	--	--	--	--	**--**	**9.8E-02**	**na**	**--**
PCB Total[C]	0	--	--	na	1.7E-03	--	--	na	1.2E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E-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**
Pentachlorophenol [C]	0	1.2E+01	9.3E+00	na	8.2E+01	5.0E+01	6.5E+01	na	5.7E+02	--	--	--	--	--	--	--	--	**5.0E+01**	**6.5E+01**	**na**	**5.7E+02**
Phenol	0	--	--	na	4.6E+06	--	--	na	3.2E+07	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+07**
Pyrene	0	--	--	na	1.1E+04	--	--	na	7.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+04**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+02**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	2.8E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.8E+01**
Strontium-90	0	--	--	na	8.0E+00	--	--	na	5.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.6E+01**
Tritium	0	--	--	na	2.0E+04	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+05**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	8.0E+01	3.5E+01	na	7.7E+04	--	--	--	--	--	--	--	--	**8.0E+01**	**3.5E+01**	**na**	**7.7E+04**
Silver	0	1.2E+01	--	na	--	4.7E+01	--	na	--	--	--	--	--	--	--	--	--	**4.7E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	1.1E+02	--	--	na	7.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+02**
Tetrachloroethylene[C]	0	--	--	na	8.9E+01	--	--	na	6.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.2E+02**
Thallium	0	--	--	na	6.3E+00	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.4E+01**
Toluene	0	--	--	na	2.0E+05	--	--	na	1.4E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+06**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	2.9E+00	1.4E-03	na	5.3E-02	--	--	--	--	--	--	--	--	**2.9E+00**	**1.4E-03**	**na**	**5.3E-02**
Tributyltin	0	4.6E-01	6.3E-02	na	--	1.8E+00	4.4E-01	na	--	--	--	--	--	--	--	--	--	**1.8E+00**	**4.4E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	6.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.6E+03**
1,1,2-Trichloroethane[C]	0	--	--	na	4.2E+02	--	--	na	2.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+03**
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	5.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.7E+03**
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	4.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+02**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	6.1E+01	--	--	na	4.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+02**
Zinc	0	2.1E+02	1.6E+02	na	6.9E+04	8.6E+02	1.1E+03	na	4.8E+05	--	--	--	--	--	--	--	--	**8.6E+02**	**1.1E+03**	**na**	**4.8E+05**

Notes:

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

Metal	Target Value (SSTV)
Antimony	3.0E+04
Arsenic	5.4E+02
Barium	na
Cadmium	6.3E+00
Chromium III	4.2E+02
Chromium VI	2.6E+01
Copper	4.2E+01
Iron	na
Lead	9.0E+01
Manganese	na
Mercury	3.6E-01
Nickel	1.2E+02
Selenium	2.1E+01
Silver	1.9E+01
Zinc	3.4E+02

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

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: DuPont- Spruance Permit No.: VA0004669

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

Stream Information

Mean Hardness (as CaCO3) =	63.6	mg/L
90% Temperature (Annual) =	28.6	deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =	7.9	SU
10% Maximum pH =	7.3	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	143	MGD
7Q10 (Annual) =	257.4	MGD
30Q10 (Annual) =	257.4	MGD
1Q10 (Wet season) =		MGD
30Q10 (Wet season) =		MGD
30Q5 =	257.4	MGD
Harmonic Mean =	257.4	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) =	627.5	mg/L
90% Temp (Annual) =	40	deg C
90% Temp (Wet season) =		deg C
90% Maximum pH =	8.36	SU
10% Maximum pH =	7.6	SU
Discharge Flow =	28.6	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	2.7E+04	--	--	--	--	--	--	--	--	--	--	na	2.7E+04
Acrolein	0	--	--	na	7.8E+02	--	--	na	7.8E+03	--	--	--	--	--	--	--	--	--	--	na	7.8E+03
Acrylonitrile[C]	0	--	--	na	6.6E+00	--	--	na	6.6E+01	--	--	--	--	--	--	--	--	--	--	na	6.6E+01
Aldrin [C]	0	3.0E+00	--	na	1.4E-03	1.8E+01	--	na	1.4E-02	--	--	--	--	--	--	--	--	**1.8E+01**	--	na	**1.4E-02**
Ammonia-N (mg/l) (Yearly)	0	9.23E+00	1.01E+00	na	--	5.5E+01	1.0E+01	na	--	--	--	--	--	--	--	--	--	**5.5E+01**	**1.0E+01**	na	--
Ammonia-N (mg/l) (High Flow)	0	4.20E+00	1.38E+00	na	--	4.2E+00	1.4E+00	na	--	--	--	--	--	--	--	--	--	**4.2E+00**	**1.4E+00**	na	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	**1.1E+06**
Antimony	0	--	--	na	4.3E+03	--	--	na	4.3E+04	--	--	--	--	--	--	--	--	--	--	na	**4.3E+04**
Arsenic	o	3.4E+02	1.5E+02	na	--	2.0E+03	1.5E+03	na	--	--	--	--	--	--	--	--	--	**2.0E+03**	**1.5E+03**	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	7.1E+02	--	--	na	7.1E+03	--	--	--	--	--	--	--	--	--	--	na	**7.1E+03**
Benzidine[C]	0	--	--	na	5.4E-03	--	--	na	5.4E-02	--	--	--	--	--	--	--	--	--	--	na	**5.4E-02**
Benzo (a) anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	**4.9E+00**
Benzo (b) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	**4.9E+00**
Benzo (k) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	**4.9E+00**
Benzo (a) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	**4.9E+00**
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	**1.4E+02**
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+06	--	--	--	--	--	--	--	--	--	--	na	**1.7E+06**
Bromoform [C]	0	--	--	na	3.6E+03	--	--	na	3.6E+04	--	--	--	--	--	--	--	--	--	--	na	**3.6E+04**
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+04	--	--	--	--	--	--	--	--	--	--	na	**5.2E+04**
Cadmium	0	6.6E+00	1.3E+00	na	--	3.9E+01	1.3E+01	na	--	--	--	--	--	--	--	--	--	**3.9E+01**	**1.3E+01**	na	--
Carbon Tetrachloride [C]	0	--	--	na	4.4E+01	--	--	na	4.4E+02	--	--	--	--	--	--	--	--	--	--	na	**4.4E+02**
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	1.4E+01	4.3E-02	na	2.2E-01	--	--	--	--	--	--	--	--	**1.4E+01**	**4.3E-02**	na	**2.2E-01**
Chloride	0	8.6E+05	2.3E+05	na	--	5.2E+06	2.3E+06	na	--	--	--	--	--	--	--	--	--	**5.2E+06**	**2.3E+06**	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.1E+02	1.1E+02	na	--	--	--	--	--	--	--	--	--	**1.1E+02**	**1.1E+02**	na	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+05	--	--	--	--	--	--	--	--	--	--	na	**2.1E+05**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	3.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+03**
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	2.9E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+05**
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	4.3E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+04**
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+03**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	5.0E-01	4.1E-01	na	--	--	--	--	--	--	--	--	--	**5.0E-01**	**4.1E-01**	**na**	**--**
Chromium III	0	8.3E+02	8.6E+01	na	--	5.0E+03	8.6E+02	na	--	--	--	--	--	--	--	--	--	**5.0E+03**	**8.6E+02**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	9.6E+01	1.1E+02	na	--	--	--	--	--	--	--	--	--	**9.6E+01**	**1.1E+02**	**na**	**--**
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E+00**
Copper	0	2.1E+01	1.0E+01	na	--	1.2E+02	1.0E+02	na	--	--	--	--	--	--	--	--	--	**1.2E+02**	**1.0E+02**	**na**	**--**
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	1.3E+02	5.2E+01	na	2.2E+06	--	--	--	--	--	--	--	--	**1.3E+02**	**5.2E+01**	**na**	**2.2E+06**
DDD [C]	0	--	--	na	8.4E-03	--	--	na	8.4E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.4E-02**
DDE [C]	0	--	--	na	5.9E-03	--	--	na	5.9E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E-02**
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	6.6E+00	1.0E-02	na	5.9E-02	--	--	--	--	--	--	--	--	**6.6E+00**	**1.0E-02**	**na**	**5.9E-02**
Demeton	0	--	1.0E-01	na	--	--	1.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E+00**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E+00**
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	1.6E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+05**
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+05**
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+04**
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+04**
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	7.7E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+00**
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	4.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+03**
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	9.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.9E+03**
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+05**
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	1.4E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+06**
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	7.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.9E+03**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	3.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.9E+03**
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+04**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	1.4E+00	5.6E-01	na	1.4E-02	--	--	--	--	--	--	--	--	**1.4E+00**	**5.6E-01**	**na**	**1.4E-02**
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	1.2E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+06**
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	5.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+02**
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	2.3E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.3E+04**
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	2.9E+07	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+07**
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+05**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	7.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+03**
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	9.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.1E+02**
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**na**
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	5.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E+01**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	1.3E+00	5.6E-01	na	2.4E+03	--	--	--	--	--	--	--	--	**1.3E+00**	**5.6E-01**	**na**	**2.4E+03**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	1.3E+00	5.6E-01	na	2.4E+03	--	--	--	--	--	--	--	--	**1.3E+00**	**5.6E-01**	**na**	**2.4E+03**
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	2.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+03**
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	5.2E-01	3.6E-01	na	8.1E+00	--	--	--	--	--	--	--	--	**5.2E-01**	**3.6E-01**	**na**	**8.1E+00**
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	8.1E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+00**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+05**
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.7E+03**
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+05**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	3.1E+00	3.8E-02	na	2.1E-02	--	--	--	--	--	--	--	--	**3.1E+00**	**3.8E-02**	**na**	**2.1E-02**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	3.1E+00	3.8E-02	na	1.1E-02	--	--	--	--	--	--	--	--	**3.1E+00**	**3.8E-02**	**na**	**1.1E-02**
Hexachlorobenzene[C]	0	--	--	na	7.7E-03	--	--	na	7.7E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E-02**
Hexachlorobutadiene[C]	0	--	--	na	5.0E+02	--	--	na	5.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.0E+03**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	1.3E-01	--	--	na	1.3E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+00**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	4.6E-01	--	--	na	4.6E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+00**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	5.7E+00	--	na	6.3E+00	--	--	--	--	--	--	--	--	**5.7E+00**	**--**	**na**	**6.3E+00**
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+05**
Hexachloroethane[C]	0	--	--	na	8.9E+01	--	--	na	8.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+02**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+01	na	--	--	--	--	--	--	--	--	--	**--**	**2.0E+01**	**na**	**--**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E+00**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Isophorone[C]	0	--	--	na	2.6E+04	--	--	na	2.6E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+05**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	2.1E+02	1.7E+01	na	--	1.3E+03	1.7E+02	na	--	--	--	--	--	--	--	--	--	**1.3E+03**	**1.7E+02**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E+00**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	8.4E+00	7.7E+00	na	5.1E-01	--	--	--	--	--	--	--	--	**8.4E+00**	**7.7E+00**	**na**	**5.1E-01**
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+04**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**3.0E-01**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+05**
Nickel	0	2.7E+02	2.4E+01	na	4.6E+03	1.6E+03	2.4E+02	na	4.6E+04	--	--	--	--	--	--	--	--	**1.6E+03**	**2.4E+02**	**na**	**4.6E+04**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+04**
N-Nitrosodimethylamine[C]	0	--	--	na	8.1E+01	--	--	na	8.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+02**
N-Nitrosodiphenylamine[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+03**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	1.4E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+02**
Parathion	0	6.5E-02	1.3E-02	na	--	3.9E-01	1.3E-01	na	--	--	--	--	--	--	--	--	--	**3.9E-01**	**1.3E-01**	**na**	**--**
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-01**	**na**	**--**
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-01**	**na**	**--**
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-01**	**na**	**--**
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-01**	**na**	**--**
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-01**	**na**	**--**
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-01**	**na**	**--**
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.4E-01**	**na**	**--**
PCB Total[C]	0	--	--	na	1.7E-03	--	--	na	1.7E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E-02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Pentachlorophenol [C]	0	1.2E+01	9.3E+00	na	8.2E+01	7.3E+01	9.3E+01	na	8.2E+02	--	--	--	--	--	--	--	--	**7.3E+01**	**9.3E+01**	**na**	**8.2E+02**
Phenol	0	--	--	na	4.6E+06	--	--	na	4.6E+07	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+07**
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+05**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+02**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+01**
Strontium-90	0	--	--	na	8.0E+00	--	--	na	8.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.0E+01**
Tritium	0	--	--	na	2.0E+04	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+05**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	1.2E+02	5.0E+01	na	1.1E+05	--	--	--	--	--	--	--	--	**1.2E+02**	**5.0E+01**	**na**	**1.1E+05**
Silver	0	7.5E+00	--	na	--	4.5E+01	--	na	--	--	--	--	--	--	--	--	--	**4.5E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	1.1E+02	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+03**
Tetrachloroethylene[C]	0	--	--	na	8.9E+01	--	--	na	8.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+02**
Thallium	0	--	--	na	6.3E+00	--	--	na	6.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.3E+01**
Toluene	0	--	--	na	2.0E+05	--	--	na	2.0E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+06**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	4.4E+00	2.0E-03	na	7.5E-02	--	--	--	--	--	--	--	--	**4.4E+00**	**2.0E-03**	**na**	**7.5E-02**
Tributyltin	0	4.6E-01	6.3E-02	na	--	2.8E+00	6.3E-01	na	--	--	--	--	--	--	--	--	--	**2.8E+00**	**6.3E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	9.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.4E+03**
1,1,2-Trichloroethane[C]	0	--	--	na	4.2E+02	--	--	na	4.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.2E+03**
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	8.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+03**
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	6.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.5E+02**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	6.1E+01	--	--	na	6.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.1E+02**
Zinc	0	1.7E+02	1.4E+02	na	6.9E+04	1.0E+03	1.4E+03	na	6.9E+05	--	--	--	--	--	--	--	--	**1.0E+03**	**1.4E+03**	**na**	**6.9E+05**

Notes:

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

Metal	Target Value (SSTV)
Antimony	4.3E+04
Arsenic	8.2E+02
Barium	na
Cadmium	7.9E+00
Chromium III	5.2E+02
Chromium VI	3.8E+01
Copper	5.0E+01
Iron	na
Lead	1.0E+02
Manganese	na
Mercury	5.1E-01
Nickel	1.4E+02
Selenium	3.0E+01
Silver	1.8E+01
Zinc	4.1E+02

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

Fact Sheet
DuPont - Spruance

Outfall 001

Chlorides

Facility = DuPont 001
Chemical = Chlorides
Chronic averaging period = 4
WLAa = 3400000
WLAc = 1600000
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = 164000
Variance = 9682559
C.V. = 0.6
97th percentile daily values = 399080.
97th percentile 4 day average = 272861.
97th percentile 30 day average= 197792.
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
164000

Note: This datum was reported in the Attachment A monitoring submitted with this permit reissuance application.

Copper

Facility = DuPont 001
Chemical = Copper (TR)
Chronic averaging period = 4
WLAa = 110
WLAc = 86
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = 20
Variance = 144
C.V. = 0.6
97th percentile daily values = 48.6683
97th percentile 4 day average = 33.2758
97th percentile 30 day average= 24.1210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
20

Zinc

Facility = DuPont 001
Chemical = Zinc (TR)
Chronic averaging period = 4
WLAa = 860
WLAc = 1100
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = 20
Variance = 144
C.V. = 0.6
97th percentile daily values = 48.6683
97th percentile 4 day average = 33.2758
97th percentile 30 day average= 24.1210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
20

Note: This datum was reported in the Form 2C Outfall 001 monitoring submitted with this permit reissuance application.

Lead

Facility = DuPont 001
Chemical = Lead (TR)
Chronic averaging period = 4
WLAa = 1200
WLAc = 150
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

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

No Limit is required for this material

The data are:
1

Note: These data were reported in the Form 2C monitoring submitted with this permit reissuance application.

Outfall 001

Ammonia as N (actual)

Facility = DuPont 001
Chemical = Ammonia (Actual)
Chronic averaging period = 30
WLAa = 35
WLAc = 6.7
Q.L. = 0.2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 25
Expected Value = .998691
Variance = .572551
C.V. = 0.757662
97th percentile daily values = 2.85181
97th percentile 4 day average = 1.85979
97th percentile 30 day average= 1.25854
< Q.L. = 1
Model used = delta lognormal

No Limit is required for this material

The data are:

0.45	0.85
0.65	0.47
0.39	0.57
0.46	0.68
0.43	1.2
0.41	1.06
0.71	2.29
1.37	1.65
1.4	2.85
2.9	0.89
0.24	1
1.13	0.67
0.03	

Note: These data were obtained from the DMRs submitted from 2006 through 2008. All data are in mg/L.

Ammonia as N (theoretical)

Facility = DuPont 001
Chemical = Ammonia (Theoretical)
Chronic averaging period = 30
WLAa = 55
WLAc = 10
Q.L. = 0.2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = 6.33
Variance = 14.4248
C.V. = 0.6
97th percentile daily values = 15.4035
97th percentile 4 day average = 10.5317
97th percentile 30 day average= 7.63431
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
6.33
Note: This datum is a theoretical value based on the long term average flow at Outfall 001 of 28.60 MGD and the maximum allowed ammonia mass loading of 685 kg/d. See discussion below.

The analyses presented above are used in determining the need for an ammonia limitation at Outfall 001. The theoretical ammonia evaluation is necessary to determine if the allowable ammonia loading from Outfall 101 is compatible with the WQS for this parameter. The intent of conducting these two separate reasonable potential analyses was to cover both actual condition and worst-case scenario.

Outfall 101 contains an ammonia daily maximum limitation of 685 kg/d for the winter season which is based on the Richmond Crater Water Quality Management Plan. Should this maximum amount of ammonia be discharged at Outfall 101, the resulting concentration exiting Outfall 001 would be 6.33 mg/L (based on the long term average flow of 28.60 MGD at Outfall 001). The use of the long term average flow is conservative because it results in the largest calculated ammonia concentration used in the analyses.

Note that the WLAs for the ammonia evaluations vary based on the use of actual or theoretical ammonia concentrations at Outfall 001. While the actual ammonia data is evaluated based on the maximum 30-day average and the corresponding dilution ratios (based on the 60 MGD mixing model: 4:1 acute, 7:1 chronic), the theoretical ammonia datum is evaluated based on the long term average flow (i.e. the average 30-day average) and the corresponding dilution ratios (based on the 40 MGD mixing model: 6:1 acute and 10:1 chronic). Both MSTRANTI evaluations are included in this attachment.

Fact Sheet
DuPont - Spruance

Outfall 001

Nickel

Facility = DuPont 001
Chemical = Nickel (TR)
Chronic averaging period = 4
WLAa = 1300
WLAc = 190
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = 10
Variance = 36
C.V. = 0.6
97th percentile daily values = 24.3341
97th percentile 4 day average = 16.6379
97th percentile 30 day average= 12.0605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
10

Silver

Facility = DuPont 001
Chemical = Silver (TR)
Chronic averaging period = 4
WLAa = 47
WLAc =
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 1
Expected Value = .5
Variance = .09
C.V. = 0.6

97th percentile daily values = 1.21670
97th percentile 4 day average = .831895
97th percentile 30 day average= .603026
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
0.5

Note: These data were reported in the Form 2C monitoring submitted with this permit reissuance application.

TRC

Facility = DuPont 001
Chemical = TRC
Chronic averaging period = 4
WLAa = 76
WLAc = 77
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 7

Summary of Statistics:
observations = 1
Expected Value = 20000
Variance = 1440000
C.V. = 0.6

97th percentile daily values = 48668.3
97th percentile 4 day average = 33275.8
97th percentile 30 day average= 24121.0
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 76
Average Weekly limit = 46.4137477131542
Average Monthly LImit = 37.6672084539436

The data are: 20000

Note: 20,000 µg/L (20 mg/L) was used to force a limitation per Guidance Memorandum 00-2011. As indicated, the TRC weekly and daily maximum limits are 0.038 mg/L and 0.076 mg/L, respectively.

Outfall 103

The following pages were taken from DuPont's "Application and Concept Engineering Reports" submitted by transmittal letter dated September 24, 1992 and revised by letter dated April 7, 1993. The pertinent sections are Section IV.B – General Development Approach, which begins on page 10 and ends on page 13, and Section VI, which begins on page 24 and ends on page 26.

In the 2002 permit reissuance, DuPont included information in the permit application revising their drinking water guideline for HMPA from 0.9 µg/L to 2 µg/L. The revised limitations for HMPA were calculated for that permit reissuance and carried forward with this permit reissuance.

review of test data that a value of at least 800 µg/L protects aquatic life from a chronic toxicity standpoint. Haskell has also determined that a value of at least 0.9 µg/L is protective of human health where daily intake is limited to ingestion of water. This is appropriate since there should be no atmospheric sources of this nonvolatile compound, and Haskell has found there is no significant bioaccumulation of the compound with regard to fish tissue consumption. Therefore, HMPA standards could be based on a river concentration of 0.9 µg/L for human ingestion purposes. Finally, EPA has never set an effluent guideline for HMPA. Therefore, an appropriate BAT standard can be developed base don a case-by-case approach.

5. **Zinc**

Zinc standards should be based on the Virginia water quality standards or on BAT. The Virginia chronic aquatic standard for zinc is 64.9 µg/L. The OCPSF limit for zinc is 2.61 mg/L, MDL, and 1.05 mg/L, AML.

B. General Development Approach

Tables 4 through 6 present the sequence followed in developing target effluent limits for the groundwater treatment system. The methodology used was based on a Virginia SWCB memorandum, "OWRM Guidance Memo No. 92-012, Guidance on the Use of Water Quality Standards for Toxics in VPDES Permits," April 13, 1992.

Table 4 shows the development of the WLA for each contaminant from three variable: allowable receiving water concentration, river flow basis, and dilution factor. Note that the groundwater treatment plant discharge was taken as 250 gpm, which includes the expected flow of about 160 gpm when Phase II off-site groundwater extraction is implemented, as well as during nonsteady-state operation during Phase I, along with about 85 gpm of quench and scrubber water from the afterburner system. The groundwater treatment system discharge is designated as "Outfall 004."

The river flow basis was combined with anticipated groundwater treatment plant discharge to obtain a dilution factor, which was then multiplied by the target receiving water concentrations to obtain the waste load allocations (WLA). The lowest of these values (highlighted in the table) were used as the basis for calculating the limits (see Table 5).

Table 4
Effluent Limit Development
Water Quality Criteria

	Chronic Aquatic (µg/L)	Human Health (Carcinogen) (µg/L)	Human Health (Noncarcinogen) (µg/L)
Receiving Water Concentration			
Chloroform	100 (H)	57 (V)	---
TCFM	100 (H)	---	10,000 (H)
HMPA	800 (H)	0.9 (H)	0.09 (D)
CS2	8 (H)	---	800 (H)
Zinc	64.9 (V)	---	5,000 (V)
River Flow Basis	7Q10	Harmonic Mean	30Q5
(cfs)	720	3127	1064
Dilution Factor			
Outfall 004 @250 gpm	1290X	5610X	1920X
Wasteload Allocations			
Chloroform	**129,000**	320,000	
TCFM	**129,000**	---	19,100,000
HMPA	1,030,000	5,000	**172**
CS2	**10,300**	---	1,530,000
Zinc	**83,700**	---	9,550,000

V: Virginia WQ Standard
H: Recommended value developed by Haskell Toxicological Lab in absence of VA/EPA standard
D: Value that Du Pont is targeting, representing 1/10 of HHc value

Table 5
Development of Limit Values Based on Waste Load Allocation
(Assumes two samples/month, 250 gpm flow)

Outfall 004	WLA (µg/L)	LTA* (µg/L)	AML* (µg/L)	MDL** µg/L)
Chloroform	129,000	77,400	129,000	188,000
TCFM	129,000	77,400	129,000	188,000
HMPA	172	103	172	250
CS2	10,300	6180	10,300	15,000
Zinc (Chronic)***	83,700	50,220	83,700	122,000

* Based on 97th percentile, Z = 1.881, 1.67 multiplier
** z = 1.881, 2.43 multiplier
***Acute basis not appropriate since Outfall 004 is substantially diluted in site 001 before discharge.

The first column in Table 5 is the WLA already established. To calculate the chronic long-term average (LTA) the following equation was applied:

$$LTA_c = WLA_c \cdot e^{[0.5\sigma_4 2 - z\,\sigma_4]}$$

where $\sigma_4^2 = 1n\,[CV^2/4 + 1]$
$z = 1.881$ for 97th percentile occurrence probability

Once the LTA was calculated, the following equations were used to obtain the limits:

$$MDL = LTA \cdot e^{[z\sigma - 0.5\,\sigma^2]}$$

$$AML = LTA \cdot e^{[z\sigma_n - 0.5\,\sigma_n^2]}$$

All equations were obtained from tables in an EPA technical support document presented in the OWRM memorandum, April 13, 1992. The 97th percentile factors were selected in this evaluation based on verbal guidance from Ray Jenkins on July 24, 1992.

Table 5 shows that the limits calculated on a water quality basis are quite high for all pollutants except HMPA. For this reason, the limits for chloroform, TCFM, and CS_2 should be set based on BAT. Values need to be set based on the groundwater treatment flow of 160 gpm and adjusted proportionately downward to represent the total flow of 250 gpm including the afterburner scrubber water.

For HMPA, limits are recommended to achieve 50% of the water quality-based concentration to account for contributions from other sources. It should be recognized that the basis for the HMPA WLA was one-tenth of the recommended water quality value (see footnote in Table 4). Finally, since the water quality-based limits on zinc are so high, it was assumed that no limit need be applied to the groundwater treatment plant discharge. Instead, a sitewide limit could be applied at outfall 001.

Table 6 gives the concentration basis for recommended limits resulting from the evaluation presented above. The actual final limits are recommended in Section VII and are mass-based. Limits on other parameters and other outfalls (e.g., zinc limits at outfall 001) are discussed in Section VII.

Table 6
Concentration Basis for
Final Recommended Limits

Outfall 004	AML	MDL	Comments
Chloroform (µg/L)	71	208	BAT for OCPSF (Subpart J)
TCFM (µg/L)	71	208	BPJ BAT
HMPA (µg/L)	86	125	50% safety factor x Table 5 values
CS2 (mg/L)	1.3	3.2	BPJ BAT
Zinc (µg/L)	NL	NL	Controlled by 001 limits

V. TREATABILITY OF GROUNDWATER

A. Bench-Scale Treatability and Preliminary Computer Simulations

A treatability study was performed in January 1990 to evaluate technologies to remediate groundwater at the Spruance site. Through laboratory tests performed at the Du Pont Engineering Test Center near Wilmington, Delaware, and computer modeling performed by the chemical engineering consultants in Du Pont Engineering, several technologies were investigated to remove the four organic contaminants: $CHCl_3$, TCFM, HMPA, and CS_2. The complete "Treatability Study Report" was included as part of the Spruance site NPDES permit application, submitted January 19, 1990. Zinc removal was not included in the study.

The study concluded that air or steam stripping were feasible technologies for the removal of the volatile organic constituents: $CHCl_3$, TCFM, and CS_2. All stripper work was based on computer modeling.

5. **Carbon Adsorption Beds**

Based on the flowsorb study results, the approximate carbon usage rate was found to be 6.0 lbs carbon/1,000 gallons of water treated or an annual usage rate of 505,000 lbs of carbon. Lower HMPA concentrations are expected in the full-scale plant influent; therefore, the usage rates in the full-scale plant may be lower.

For a flow rate of 160 gpm, the contact time would be 33 min in one bed or 66 min in two beds arranged in series. With a treatment objective of 80 ppb HMPA, it was determined that a two bed series design, 20,000 lbs carbon per 10 ft diameter adsorber, will be a technically sound design. Prefiltration at 10 µm was recommended. Information regarding the design may be found in Appendix 4.

The carbon usage rates were determined as follows:

First Bed Usage Rate

= 165 lbs carbon/27,450 gal water treated

= 6.01 lbs carbon/1,000 gal water treated

Two Beds in Series

= 330 lbs carbon/55,104 gal water treated
= 5.99 carbon/1,000 gal water treated

VI. EFFLUENT MONITORING AND LIMITATIONS RECOMMENDATIONS

The development of recommended discharge limitations was discussed in Section IV, Treatment Goals; Table 8 summarizes the final recommended effluent limits and monitoring parameters. Effluent limits are shown in terms of mass flux (kg/day) based on the 250 gpm design flow (groundwater flow plus afterburner quench and scrubber water) and the concentrations developed in Section IV.

Table 8 Recommended Monitoring and Limitations				
	Limits (kg/day)		Monitoring	
Outfall 004	Monthly Average	Daily Maximum	Sampling Frequency	Sample Type
Flow	NL	NL	Continuous	Recorded
Chloroform	0.097	0.283	2/month	Grab
TCFM	0.097	0.283	2/month	Grab
CS2	1.8	4.4	2/month	Grab
HMPA	0.12	0.17	2/month	24-hr composite
Zinc	NL	NL	2/month	24-hr composite
pH	NL	NL	Continuous	Recorded
Outfall 001				
Zinc	18.2	22.4	2/month	24-hr composite
pH	--	(6.0-9.0)	Continuous	Recorded

Effluent from the groundwater treatment system will be initially discharged at outfall 004 and eventually at 001, the outfall for the entire site. pH limits might typically be expected to be 6.0 to 9.0 with an excursion allowance up to 1 hour consecutively and up to a total of 7 hours, 20 minutes per month. However, since we will discharge through outfall 001 with this same site pH limit, there is no need for such a limitation at outfall 004. Appendix 9 provides pH titration results of pH-reduced groundwater in an outfall 001 sample. The titration shows that at maximum flow at outfall 004, pH in outfall 001 would not be reduced significantly vis-a-vis the pH 6.0 limit.

The biological treatment plant at the site initially discharges at outfall 002, which has a $CBOD_5$ limit. Effluent TOC data gathered during the carbon adsorption test indicate values less than 5 ppm. No CBOD information was obtained; however, the maximum $CBOD_5$ from such a TOC would be about 10 ppm. At a groundwater flow rate of 160 gpm during Phase II (and assuming essentially no CBOD in the afterburner quench and scrubber water), this would be less than 20 lbs/day, which is inconsequential versus the WLA for the entire site. Therefore, no permit limit is needed for $CBOD_5$ at outfall 004.

The only metal of potential concern that is present in the extracted groundwater is zinc, which will be discharged under the plant permit limit at outfall 001. This strategy will eliminate the generation of over 5,000 lbs/day of sludge. Although removal of only 5 lbs/day of zinc would be achieved (2.9 mg/L at 160 gpm or less), the presence of poorly filtering iron and magnesium requires that 2,000 lbs/day of filter aid be used. At a sludge

cake concentration of 40 to 50% solids, this would yield over 5,000 lbs/day sludge cake for disposal.

At the same time, the effect on the 001 outfall will be acceptable, as shown in Table 9. The zinc discharge at outfall 004 is anticipated to be only about 10 to 15% of the sitewide allocation. Therefore, no limitations on zinc are necessary at outfall 004.

Table 9
Impact of 004 Zinc on Outfall 001

	Flow (MM gpd)	AML (µg/L)	MDL (µg/L)	AML (kg/day)	MDL (kg/day)
Outfall 001	41.4	116	143	18.2	22.4
Outfall 004*	0.23*	(2900)**	(2900)**	2.5	2.5
004 Proportion of 001 Limit				14%	11%

* Phase II groundwater flow, 160 gpm, excluding dilution from afterburner quench and scrubber water.
** Value in parentheses represent anticipated discharge concentration at outfall 004, excluding dilution from afterburner quench and scrubber water.

Attachment H

Richmond Crater Water Quality Management Plan

Allied (Hopewell)	165.00	2750		10326		6.1		2750		10326		6.1
Hopewell Regional WTF	34.07	12502	44.0	12091	36.2	4.8		12502	44.0	10291	36.2	4.8
Petersburg STP	15.00	2802	22.4	801	6.4	5.0		2802	22.4	2028	16.2	5.0
TOTAL	380.81	31084		28978				36679	35958			

1 NH3-N values represent ammonia as nitrogen.

2 Dissolved oxygen limits represent average minimum allowable levels.

3 Allied (Hopewell) allocation may be redistributed to the Hopewell Regional WTF by VPDES permit.

TABLE B7- WASTE LOAD ALLOCATION FOR THE YEAR 2000

	SUMMER (June-October)							WINTER (November-May)				
	FLOW (mgd)	CBOD5		NH3-N1,3		DO2 (mg/l)		CBOD5		NH3-N1		DO2 (mg/l)
		(lbs/d)	(mg/l)	(lbs/d)	(mg/l)			(lbs/d)	(mg/l)	(lbs/d)	(mg/l)	
City of Richmond STP	45.08	3002	8.0	2403	6.4	5.6		5367	14.3		15.2	5.6
E.I. DuPont-Spruance	196.99	948		590		4.4		948		756		2.9
Falling Creek STP	10.10	1348	16.0	539	6.4	5.9		2023	24.0	1281	15.2	5.9
Proctor's Creek STP	16.80	1602	11.4	961	6.9	5.9		2403	17.1	1402	10.0	5.9
Reynolds Metals Co.	0.78	172		13		6.5		172		13		6.5
Henrico STP	32.80	3002	11.0	2403	8.8	5.6		4756	17.4	3504	12.8	5.6
American Tobacco Co.	3.00	715		113		5.8		715		113		5.8
ICI Americas, Inc.	0.20	167		8		5.8		167		8		3.1
Phillip Morris- Park 500	2.90	819		92		4.6		819		92		4.6
Allied (Chesterfield)	56.00	1255		442		5.7		1255		442		5.7
Allied (Hopewell)	170.00	2750		10326		6.1		2750		10326		6.1
Hopewell Regional WTF	36.78	12502	40.7	12091	33.5	4.8		12502	40.7	10291	33.5	4.8
Petersburg STP	15.00	2802	22.4	801	6.4	5.0		2802	22.4	2028	16.2	5.0
TOTAL	406.43	31084		28982				36679		35963		

1 NH3-N values represent ammonia as nitrogen.

2 Dissolved oxygen limits represent average minimum allowable levels.

3 Allied (Hopewell) allocation may be redistributed to the Hopewell Regional WTF by VPDES permit.

TABLE B7- WASTE LOAD ALLOCATIONS FOR THE YEAR 2010

	SUMMER (June-October)							WINTER (November-May)				
	FLOW (mgd)	CBOD5		NH3-N1,3		DO2 (mg/l)		CBOD5		NH3-N1		DO2 (mg/l)
		(lbs/d)	(mg/l)	(lbs/d)	(mg/l)			(lbs/d)	(mg/l)	(lbs/d)	(mg/l)	
City of Richmond STP	45.86	3002	7.8	2403	6.3	5.6		5367	14.0		14.9	5.6
E.I. DuPont-Spruance	16.99	948		590		4.4		948		756		2.9
Falling Creek STP	10.10	1348	16.0	539	6.4	5.9		2023	24.0	1281	15.2	5.9
Proctor's Creek STP	24.00	1602	8.0	961	4.8	5.9		2403	12.0	1402	7.0	5.9
Reynolds Metals Co.	0.78	172		13		6.5		172		13		6.5
Henrico STP	38.07	3002	9.5	2403	7.6	5.6		4756	15.0	3504	11.0	5.6
American Tobacco Co.	3.00	715		113		5.8		715		113		5.8
ICI Americas, Inc.	0.20	167		8		5.8		167		8		3.1
Phillip Morris- Park 500	2.90	819		92		4.6		819		92		4.6
Allied (Chesterfield)	56.00	1255		442		5.7		1255		442		5.7
Allied (Hopewell)	180.00	2750		10326		6.1		2750		10326		6.1
Hopewell Regional WTF	39.61	12502	37.8	10291	31.1	4.8		12502	37.8	10291	31.1	4.8
Petersburg STP	15.00	2802	22.4	801	6.4	5.0		2802	22.4	2028	16.2	5.0
TOTAL	432.1	31084		28982				36679		35963		

1 NH3-N values represent ammonia as nitrogen.

2 Dissolved oxygen limits represent average minimum allowable levels.

3 Allied (Hopewell) allocation may be redistributed to the Hopewell Regional WTF by VPDES permit.

Attachment I

Application of 40 CFR 414
Mass Loading Limitations for Outfall 101

Included in this attachment is the applicable Federal Effluent Guidelines from 40 CFR 414, the referenced EPA guidance, and mass loading calculations.

EPA guidance suggests employing the average daily maximum flow reported for the previous 12 months as one means of calculating the required mass loading limitations. The average daily maximum flow for Outfall 101 for the July 2007 to June 2008 period is 8.45 MGD which is higher than the flow previously used in these calculations (8.00 MGD). Consequently, the mass loadings were updated with respect to flow changes which occurred during the current permit term.

The BOD_5 and TSS limitations are from 40 CFR 414.31, Subpart C – Other Fibers. The guidelines establish the following concentrations to use in developing the mass limitations:

Parameter	Monthly Average	Daily Maximum
BOD_5	18 mg/L	48 mg/L
TSS	36 mg/L	115 mg/L

The mass loadings were determined using the calculation:

[x] mg/L x 3.785 L/gal x 8.45 MGD = mass load (kg/d)

The BOD_5 and TSS loads were calculated as illustrated below.

Parameter	Monthly Average	Daily Maximum
BOD_5	580 kg/d	1500 kg/d
	1269 lb/d	3384 lb/d
TSS	1100 kg/d	3680 kg/d
	2538 lb/d	8109 lb/d

As this waste stream is the main source of BOD, the Richmond Crater Water Quality Management Plan (RCWQMP, 208 Plan) allocation for BOD is most appropriately applied at this point. That allocation is for a monthly average of 948 lb/d $cBOD_5$. Assuming a ratio of 2 BOD_5 to $cBOD_5$ (explained in the May 8, 1989 letter included in this attachment), the corresponding BOD_5 value is a monthly average of 1896 lb/d. The calculated mass loading based on the effluent guideline is less than the loading allowed by the RCWQMP; the permit must establish the more stringent load as the limit. The $cBOD_5$ monthly average limitation of 290 kg/d (which is equivalent to a BOD_5 limitation of 580 kg/d) therefore ensures compliance with the effluent guideline. The daily maximum limitation must also be converted to a $cBOD_5$ basis; this converted value is 750 kg/d.

The additional limitations established for this outfall (with the exception of the ammonia limitation) are from 40 CFR 414.91, Subpart I – Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment. The mass loadings were determined using the calculation:

[x] µg/L x 3.785 L/gal x 8.45 MGD x 10^{-9} kg/ µg x 10^{6} gal/MG = mass load (kg/d)

The calculated mass loadings are detailed in the following table.

Note: The number of significant digits in the permit limitations reflect the number of significant digits in the under lying guideline (e.g. the TSS monthly average federal effluent guideline has two significant digits while the daily maximum value has three; therefore the monthly average limitation is expressed in two significant digits while the daily maximum limitation is expressed in three).

DuPont - Spruance Outfall 101 Mass Loadings

Parameter	Daily Maximum (µg/L)	Monthly Avg (µg/L)	Daily Maximum (kg/d)	Monthly Avg (kg/d)
Total Nickel	3980	1690	127.3	54.05
Total Zinc	2610	1050	83.48	33.58
Total Chromium	2770	1110	88.59	35.50
Total Cyanide	1200	420	38.38	13.4
Total Copper	3380	1450	108.1	46.38
Total Lead	690	320	22.1	10.2
Trichloroethylene	54	21	1.7	0.67
Bis (2-ethylhexyl) phthalate	279	103	8.92	3.29
Ethylbenzene	108	32	3.45	1.0
Vinyl Chloride	268	104	8.57	3.33
Phenol	26	15	0.83	0.48
Acrylonitrile	242	96	7.74	3.1
Methylene Chloride	89	40	2.8	1.3
Di-n-butyl phthalate	57	27	1.8	0.86
4,6-Dinitro-o-cresol	277	78	8.86	2.5
2-Nitrophenol	69	41	2.2	1.3
Benzene	136	37	4.35	1.2
1,1,1-Trichloroethane	54	21	1.7	0.67
Tetrachloroethylene	56	22	1.8	0.70
Toluene	80	26	2.6	0.83
Chloroform	46	21	1.5	0.67
Carbon Tetrachloride	38	18	1.2	0.58
2,4-Dinitrotoluene	285	113	9.12	3.61
2,6-Dinitrotoluene	641	255	20.5	8.16
1,1-Dichloroethylene	25	16	0.80	0.51
1,2-Dichlorobenzene	163	77	5.21	2.5
1,2-Dichloroethane	211	68	6.75	2.2
1,2-Dichloropropane	230	153	7.36	4.89
1,2-trans-Dichloroethylene	54	21	1.7	0.67
1,2,4-Trichlorobenzene	140	68	4.48	2.2
1,3-Dichlorobenzene	44	31	1.4	0.99
1,3-Dichloropropylene	44	29	1.4	0.93
1,4-Dichlorobenzene	28	15	0.90	0.48
2-Chlorophenol	98	31	3.1	0.99
2,4-Dichlorophenol	112	39	3.58	1.2
2,4-Dimethylphenol	36	18	1.2	0.58
2,4-Dinitrophenol	123	71	3.93	2.3
3,4-Benzofluoranthene	61	23	2.0	0.74
4-Nitrophenol	124	72	3.97	2.3
Acenaphthene	59	22	1.9	0.70
Acenaphthylene	59	22	1.9	0.70
Anthracene	59	22	1.9	0.70
Benzo(a)anthracene	59	22	1.9	0.70
Benzo(a)pyrene	61	23	2.0	0.74
Benzo(k)fluoranthene	59	22	1.9	0.70
Chlorobenzene	28	15	0.90	0.48
Chloroethane	268	104	8.57	3.33
Chrysene	59	22	1.9	0.70
Diethyl phthalate	203	81	6.49	2.6
Dimethyl phthalate	47	19	1.5	0.61
Fluoranthene	68	25	2.2	0.80
Fluorene	59	22	1.9	0.70
Hexachlorobenzene	28	15	0.90	0.48
Hexachlorobutadiene	49	20	1.6	0.64
Hexachloroethane	54	21	1.7	0.67
Methyl Chloride	190	86	6.08	2.8
Naphthalene	59	22	1.9	0.70
Nitrobenzene	68	27	2.2	0.86
Phenanthrene	59	22	1.9	0.70
Pyrene	67	25	2.1	0.80
1,1,2-Trichloroethane	54	21	1.7	0.67
1,1-Dichloroethane	59	22	1.9	0.70

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 12 1988

OFFICE OF WATER

MEMORANDUM

SUBJECT: Questions and Answers Regarding the OCPSF Effluent Limitations Guidelines

FROM: James R. Elder, Director
Office of Water Enforcement and Permits (OWEP)

TO: Regional Water Management Division Directors
NPDES State Directors

The final rule establishing effluent limitations guidelines, pretreatment standards, and new source performance standards for the organic chemicals, plastics, and synthetic fibers (OCPSF) point source category (the "guideline") was promulgated on November 5, 1987 and became effective on December 21, 1987. There has been and will be increased concern over the implementation schedules and permit requirements. The purpose of this memorandum is to provide you a list of questions and answers (Q's & A's, as attached) which are most frequently asked by permit writers and permittees regarding the guideline. The areas of concern which are covered by the Q's & A's are given below:

Question No.	
1 - 3	Applicability of the Guideline
4 - 6	Calculation of Permit Limits
7, 8	Monitoring Requirements
9 - 11	Promulgation and Implementation of the Guidelines
12	Disparity of Limitations between Subparts I and J
13	Whole-effluent Toxicity Testing of OCPSF Effluent
14	Metals in OCPSF Streams
15 - 18	Fundamentally Different Factors (FDF) Variance Requests

By providing these answers, we hope many issues and challenges will be eliminated before the permits are drafted.

If you have any questions or comments, please contact me or James Gallup, Chief of the Technical Support Branch at (202) 475-9541.

Attachment

QUESTIONS AND ANSWERS (Q'S & A'S) REGARDING

THE ORGANIC CHEMICALS, PLASTICS, AND SYNTHETIC FIBERS (OCPSF) EFFLUENT LIMITATIONS GUIDELINES

QUESTIONS REGARDING THE APPLICABILITY OF THE GUIDELINE

Question 1 - Do the OCPSF pretreatment requirements apply to discharges from compounding and formulation processes?

Answer:

No. The OCPSF pretreatment standards do not apply to wastewater discharges from compounding and formulation processes. However, if such wastes mix with regulated OCPSF wastewater prior to treatment, the combined wastestream formula (CWF) would allocate allowances for any unregulated wastestreams. In circumstances where there are no regulated wastestreams present, pollutants may be present in the discharge from formulation processes in amounts that warrant control under local limits.

Question 2 - Are auxiliary establishments primarily engaged in performing support services such as research and development activities exempt from the OCPSF requirements?

Answer:

OCPSF facilities which engage in support service activities such as research and development, pilot plant, technical services, and laboratory bench scale operations are subject to the OCPSF requirements *if* such operations are conducted in conjunction with and related to existing OCPSF manufacturing activities at the plant site [40 CFR 414.11(b)]. However, if the auxiliary establishment is located at a physically separate site from the OCPSF manufacturing facility, then the OCPSF requirements would not be applicable as long as the product manufactured at this auxiliary site is not sold. That is, the sale of the product would make the auxiliarysite's operation a commercial manufacturing facility subject to the OCPSF regulations.

Question 3 - At a facility where the primary production activity is not regulated by the OCPSF pretreatment requirements, would a wastestream resulting from the production of small quantities of intermittently produced specialty chemicals subject the facility to the OCPSF pretreatment requirements?

Answer:

The OCPSF Pretreatment Regulations provide no exemption for intermittently produced, small quantity production. In the event that a facility's primary production activity is not regulated by the OCPSF requirements but an auxiliary product, such as a specialty chemical is manufactured which does fall under the OCPSF requirements, and both wastestreams are mixed prior to treatment, then the combined wastestream formula applies. However, for facilities that combine regulated and nonregulated wastestreams after treatment but prior to the monitoring point (usually at the sewer connection to the public sanitary sewer), a flow weighted average (FWA) or more stringent approach must be used to adjust Categorical Pretreatment Standards. In the preamble to the June 12, 1986 proposed rules (51 FR 21462), EPA clarified when CWF and FWA must be used.

QUESTIONS REGARDING THE CALCULATION OF PERMIT LIMITS

Question 4 - How is "process wastewater" defined in the guideline?

Answer:

Process wastewater has been defined in 40 CFR 401.11(q) as "any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product." The Development Document for Effluent Limitations Guidelines and Standards for the OCPSF Point Source Category further describes, "OCPSF process wastewater discharges are defined as discharges from all establishments or portions of establishments that manufacture the products or product groups listed in the applicability sections of the regulation and also in Appendix III-A of this document, and are included within the following ... SIC major groups: 2865, 2869, 2821, 2823, 2824..." (p. III-20). Please refer to Section V.A. (p. V-1) of the Development Document for examples of process wastewater. Noncontact cooling waters, utility wastewaters, general site surface runoff, ground waters, and other nonprocess waters generated on site are specifically excluded from the definition of process wastewater discharges.

Question 5 - What procedure will be followed for determining permit limitations for plants which fall within more than one of the guideline subcategories?

Answer:

For best practicable control technology currently available (BPT) limits, a facility whose production activities fall within two or more subcategories should follow a procedure pursuant to Section VI.A.1 (p. 42533) of the preamble of the OCPSF regulations. The preamble states, "[i]n applying the limitations set forth in the regulation, the permit writer will use what is essentially a building-block approach that takes into consideration applicable subcategory characteristics and the proportion of production quantities within each subcategory at the plant. Production characteristics are reflected explicitly in the plant's limitations through the use of this approach." Section IX.E (p. IX-10) of the Development Document further describes the procedure as follows (assuming that all subcategorical process wastewaters are discharged into the same outfall): First, calculate the subcategory proportion by dividing the annual production rate (lbs/yr) for each subcategorical activity by the facility's total OCPSF production rate. Next, multiply each subcategory proportion by the BPT concentration limits to get the weighted concentration for each subcategory. Then, add all the weighted concentrations to get the total OCPSF concentration limit. Finally, calculate the OCPSF mass limits by multiplying the total OCPSF concentration limits by the facility's total OCPSF process wastewater flow.

In some cases, non-OCPSF process streams and/or other nonprocess streams contributing to the same outfall may require additional concentration limits based on the permit writer's best professional judgment (BPJ). A flow-weighted approach should then be used to calculate the final concentration limit on the permit. The final mass limit on the permit can be calculated by multiplying the final concentration limit by the total flow discharged from that outfall.

For best available technology economically achievable (BAT) limits, the procedure for calculating the mass limits in Subparts I and J of the OCPSF rules should be followed whether a facility falls into a single subcategory or multiple subcategories.

Question 6 - How does the permit writer determine the proper "flow" figure to use in calculating permit limits?

Answer:

EPA believes, in general, that the long-term average process wastewater flow taken from a representative production year is the appropriate value to use for the mass limits calculation. It would be within the permit writer's discretion to consider

various data in determining a proper long-term average flow for each facility, e.g., the highest monthly average flow during the past twelve (12) months or the highest yearly mean of the twelve monthly average flows during the past five (5) years. The selected flow will then be used to calculate both the daily maximum and monthly average mass limits.

In cases where the process wastewater flow claimed by the industry may be excessive, the permit writer may develop a more appropriate process wastewater flow for use in computing the mass limits. Significant factors, such as the component flows, the facility's water conservation practices, and the barometric condenser use at the process level, should all be considered in developing the appropriate process wastewater flow. Section XIV.A (p. 42566) of the preamble to the regulation has a detailed discussion on this matter.

In situations where flow varies significantly from day-to-day, the permit writer may also take this into consideration. In some special instances, the permit writer may find that a tiered permit is warranted due to the variability of production and resulting changes in flow conditions. In these cases, the permit writer should use discretion to develop a case-by-case determination with appropriate supporting documentation and rationale. In any event, the permittee is responsible for demonstrating to the permit writer the need for special consideration of flow variations in the permit.

QUESTIONS REGARDING THE MONITORING REQUIREMENTS

Question 7 - What will be the required monitoring frequency for toxic pollutants regulated by the OCPSF guidelines that are not expected to be present at levels of concern?

Answer:

The NPDES regulation (40 CFR 122.48(b)) requires that each permit specify monitoring frequency sufficient to yield data which are representative of the monitored activity. In establishing monitoring frequencies, many factors are considered by the permit writer. The monitoring scenario assumed for cost estimation during the development of the effluent limitations guidelines is one of the factors most commonly considered by the permit writer. Other typical factors include design capacity of treatment facility, type of treatment method used, significance of the pollutants, and nature and sensitivity of the water quality standards of the receiving water. For OCPSF facilities, as for all other facilities, EPA has decided that the appropriate monitoring scheme is best determined on a case-by-case basis. EPA refrains from setting inflexible monitoring frequencies in

national regulations to allow permit writers to establish frequencies that are appropriately tailored to the facility. The minimum monitoring frequency for toxic pollutants which are not expected to be present at levels of concern may be monthly or quarterly, but in no case shall it be less than once per year as required in 40 CFR 122.44(i)(2) for direct dischargers. For indirect discharges, the minimum monitoring and reporting frequency is twice per year as prescribed in 40 CFR 403.12(e)(1). Section X.4 (pp. 42557-8) of the preamble to the regulation has a detailed discussion on this matter.

Question 8 - Does the NPDES "boilerplate" language requirements (40 CFR 122.41(a)(1)) trigger the Duty to Comply with all OCPSF toxic limits even if the permit is not modified to incorporate the new limits?

Answer:

No. The OCPSF regulations do not include "Toxic Pollutant Effluent Standards and Prohibitions" as prescribed in 40 CFR Part 129, Subpart A. Consequently, the "boilerplate" language does not encompass the new OCPSF toxic regulations. The limits for toxic pollutants in the OCPSF regulations must be included in permits for them to become enforceable.

QUESTIONS REGARDING THE PROMULGATION AND IMPLEMENTATION OF THE GUIDELINES

Question 9 - Will best conventional pollutant control technology (BCT) be promulgated in the future and if so, will NSPS be made more stringent in the future?

Answer:

All BCT's are reserved in the final regulation as described in III.A.3 (p. 42525) of the preamble. NSPS for conventional pollutants (BOD5, TSS, and pH) are presently equivalent to the limits established for BPT. The States may develop BCT limits more stringent than BPT by using BPJ at this time. When a BCT analysis is done in the future, if it is determined that BCT limits should be more stringent than BPT, then the technology basis for NSPS limits will be re-assessed.

Question 10 - Will the dischargers be expected to begin purchasing and installing treatment before the final permit limits are determined?

Answer:

The statutory deadline for direct dischargers to comply with BAT is March 31, 1989; the deadline for indirect dischargers to comply with pretreatment standards for existing sources (PSES) is November 5, 1990. EPA believes that dischargers should begin now to conduct studies to determine whether additional treatment is necessary and, if so, what additional treatment should be considered. In many cases, the decision to purchase and install treatment equipment can be made after these studies and dischargers should proceed with purchasing and installing treatment equipment whether their permits contain final limits or not.

If some direct dischargers are unable to determine final permit limits, then they should meet with the permitting authority to determine final permit limits and reasonable compliance schedules, thereby avoiding delays in purchasing and installing treatment equipment.

EPA's pretreatment program requires OCPSF indirect dischargers to prepare baseline monitoring reports within 180 days after the effective date of the pretreatment standards that assess compliance and provide detailed schedules showing major events leading to construction and operation of additional treatment. If an indirect discharger has a question about their applicable pretreatment standards, they should consult their control authority.

Question 11 - Are Permitting Authorities to be given any specific deadlines for reopening the non-expiring OCPSF permits to incorporate the new guideline?

Answer:

EPA is preparing guidance which urges permitting authorities to accelerate compliance with the new guideline for OCPSF facilities. The guidance would assist permitting authorities in determining when and how to implement the guideline using all available authorities and permitting tools. One approach would be to reopen the permit and incorporate new guidelines pursuant to the reopener clause or the State's general authority. Other possible approaches are to notify OCPSF facilities that immediate compliance will be expected upon reissuance of the permit, and to use section 308 authority to request the submission of compliance plans.

EPA recently conducted a compliance assessment in selected Regions to estimate the number of OCPSF permits that can be reopened and the number of OCPSF facilities which need additional treatment for compliance with the guidelines. The assessment indicated that many existing permits have either specific reopener clauses or the permitting State has a general regulation to reopen the permit upon promulgation of new effluent limitations guidelines. The assessment also revealed that the majority of OCPSF facilities currently discharge pollutants at levels which exceed the new BPT and/or BAT guidelines.

QUESTIONS REGARDING THE DISPARITY OF LIMITATIONS BETWEEN SUBPARTS I AND J

Question 12 - Why are there a number of BAT and NSPS limitations for toxic pollutants, e.g., nitrobenzene, which allow higher effluent concentrations for dischargers that do not use end-of-pipe (Non-EOP, Subpart J) biological treatment than those using end-of-pipe (EOP, Subpart I) biological treatment?

Answer:

In developing technology-based guidelines for BAT and NSPS, EPA used performance data that properly reflected the type of treatment used, based upon the facilities' particular wastewater characteristics. In the case of nitrobenzene, the BAT limits for the EOP biological treatment subcategory were derived from a data base of four plants using the combination of steam stripping and activated carbon adsorption plus EOP biological treatment, whereas BAT limits for the Non-EOP biological treatment were from a data base of two plants using the combination of steam stripping and activated carbon adsorption alone. (See Tables VII-45 & 64 of the final Development Document.) These two sets of data were evaluated independently and resulted in the different limitations for these two subparts. Therefore, the difference between nitrobenzene limits in Subparts I and J was an inevitable result of this development procedure for technology-based limitations. Please refer to VI.C.4.d, pp. 42543-4, of the preamble for a general discussion of this particular issue.

The facilities in the EOP biological treatment subcategory are the ones which have installed, or will install, end-of-pipe biological treatment to comply with BPT limits. The facilities in the Non-EOP biological treatment subcategory are the ones with low enough levels of BOD5 in their wastestreams which do not need end-of-pipe biological treatment to comply with BPT limits. (See p. 42538, VI.C.1 & 2 of the preamble.) In the future, those plants that have lower levels of BOD5 (and no end-of-pipe biological treatment) will most likely choose to manufacture new chemicals that will also have lower BOD5 levels and require no

end-of-pipe biological treatment. However, a plant may choose to manufacture a new product or products as a result of the higher effluent limits in the Non-EOP biological treatment subcategory for selected pollutants. If the plant can comply with its permit for all limited pollutant parameters, it is the plant's prerogative to manufacture the new product(s).

Furthermore, the BAT limitations in these two subcategories are technology-based. If a State feels that certain toxic limits, e.g., nitrobenzene, are too lenient, more stringent limitations based on State Water Quality Standards or more stringent provisions of the State law can be imposed.

QUESTIONS REGARDING WHOLE-EFFLUENT TOXICITY TESTING OF OCPSF EFFLUENT

Question 13 - Should most OCPSF permits contain whole-effluent toxicity controls?

Answer:

Yes. Under sections 308 and 402 of the Clean Water Act, EPA or a State may require permittees to provide chemical, toxicity, and in-stream biological data necessary to assure compliance with water quality standards. EPA's Policy for the Development of Water Quality-based Permit Limitations for Toxic Pollutants (49 FR 9016, March 9, 1984) calls for the use of "an integrated. strategy consisting of both biological and chemical methods to address toxic and nonconventional pollutants from industrial ... sources." The Policy specifies, "[w]here there is a significant likelihood of toxic effects to biota in the receiving water, EPA and the States may impose permit limits on effluent toxicity...." As we have stated in the memo of February 8, 1988, discharges from OCPSF facilities often contain an exceptionally wide variety of pollutants. All potentially toxic pollutants discharged from OCPSF facilities cannot be inexpensively identified by chemical methods, but it is feasible to examine the whole-effluent toxicity and instream impacts using acute and/or chronic toxicity testing rather than attempt to identify and limit all toxic pollutants. For the reasons given above, EPA anticipates that whole-effluent toxicity controls, including acute or chronic toxicity limits and/or biomonitoring requirements, will be needed in most cases for OCPSF facilities. Acute or chronic toxicity limits or monitoring requirements are dependent upon available dilution and species sensitivity. Toxicity limits may be imposed for the facilities at the discretion of the permit writer on a case-by-case basis.

QUESTIONS REGARDING METALS IN OCPSF STREAMS

Question 14 - Are complexed metal-bearing wastestreams exempt from the standards for metals only, or is the wastestream also exempt from the organic and cyanide limits?

Answer:

The exemption for complexed metals in 40 CFR 414.11(f) refers to the exclusion of the standards for metals only. The exclusion applies only for the metals listed in Appendix B as complexed for the product/process in question. In addition, the wastestream is not exempt with regard to toxic organics and cyanide requirements.

QUESTIONS REGARDING THE FUNDAMENTALLY DIFFERENT FACTORS (FDF) VARIANCE REQUESTS

Question 15 - What will be the effect of imposing OCPSF limits on a permittee which has filed an FDF variance request?

Answer:

Section 301(n)(6) states that "an application for an alternative requirement under this subsection [i.e., FDF] shall not stay the applicant's obligation to comply with the effluent limitation guideline or categorical pretreatment standard which is the subject of the application." This provision applies to the FDF variance requests for BAT, BCT, and PSES. In addition, the NPDES regulation does not provide for staying the applicant's obligation to comply with the effluent limitation guideline for BPT. The guideline regulation requires compliance with PSES by November 5, 1990, while BPT and BAT limits are enforceable only when they are incorporated in NPDES permits. Permitting authorities can use enforcement discretion, when appropriate, for the permittees which have filed FDF variance requests and are not in compliance with their permit requirements.

Question 16 - What impact will section 301(n)(2) of the Clean Water Act, which requires submission of a request within 180 days of the date of establishment or revision of a limitation, have on FDF filing deadlines?

Answer:

The existing State NPDES regulations require submission of a BPT, BAT, and/or BCT FDF variance request by the close of the comment period on the draft permit which incorporates the

guideline-based limitations at issue. At this time, the existing EPA NPDES regulations also contain this requirement. The existing EPA general pretreatment regulations require submission of a FDF variance request within 180 days of the effective date of the standard from which relief is being requested or within 30 days after a categorical determination.

As indicated in the memo of February 8, 1988, EPA will consider BAT FDF variance requests submitted by OCPSF facilities to be timely if the request is submitted to the NPDES permitting authority by May 3, 1988. This requirement is based specifically on the language of section 301(n)(2). The conference report indicated that the FDF variance provisions were to be self-implementing. 132 Cong. Rec. H10567 (daily edition October 15, 1986). Note, however, our regulations at 40 CFR 123.62 provide a process for revisions to conform State programs to federal requirements and references as one such instance when controlling federal statutory authority is modified or supplemented. The preamble to the OCPSF regulation also noted that the statute overrode existing EPA FDF regulations to the extent there were any inconsistencies. 52 Fed. Reg. 42566 (November 5, 1987). EPA will be changing the NPDES (and general pretreatment) regulations to conform them to the statutory requirements. To the extent that the State NPDES regulations would provide any filing deadline which would be after May 3, 1988, the more stringent federal provision, section 301(n)(2), which requires submission no later than May 3, 1988, would control.

<u>Question 17</u> - Why is there an apparent inconsistency in filing deadlines between BPT and BAT/PSES and what is the filing deadline for BPT FDF variance requests?

Answer:

Section 301(n), on its face, only applies to BAT, BCT, and PSES FDF variance requests. EPA will continue to consider and evaluate BPT FDF variance requests in accordance with the existing NPDES regulations, since there is no superseding statutory provision. Accordingly, BPT FDF variance requests must be made by the close of the public comment period on the draft permit. EPA intends to eventually change the regulations for BPT FDFs to make them consistent with section 301(n). Moreover, EPA had strongly encouraged that BPT FDF variance requests from the OCPSF guidelines be submitted along with BAT and PSES variance requests on or before May 3, 1988.

<u>Question 18</u> - Is the language in 40 CFR §125.31(a)(1) which requires a request for relief from a "national limit which is applied in the permit...." inconsistent with the existing regulatory and/or statutory filing deadlines?

Answer:

The provision in 40 CFR §125.31(a)(1) is one of the decision criteria that is used in deciding NPDES FDF variance requests, not an application requirement. The intent of this provision is to require that there be an applicable national effluent guideline for the pollutant for which relief has been requested which is applicable to the facility. To the extent that any applicant claims that this provision allows submission of a FDF variance request after issuance of the permit containing the limitations, the application deadline in section 301(n)(2) would supersede this provision.

toxic organic management plan approved by the control authority.

(Secs. 301, 304, 306, 307, 308, and 501 of the Clean Water Act (the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1251 *et. seq.*, as amended by the Clean Water Act of 1977, Pub. L. 95–217))

[46 FR 9467, Jan. 28, 1981, as amended at 48 FR 32485, July 15, 1983; 48 FR 43681, Sept. 26, 1983]

PART 414—ORGANIC CHEMICALS, PLASTICS, AND SYNTHETIC FIBERS

Subpart A—General

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414.11 Applicability.
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Subpart B—Rayon Fibers

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414.23 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
414.24 New source performance standards (NSPS).
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414.31 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).
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414.34 New source performance standards (NSPS).
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414.40 Applicability; description of the thermoplastic resins subcategory.
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414.43 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
414.44 New source performance standards (NSPS).
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Subpart E—Thermosetting Resins

414.50 Applicability; description of the thermosetting resins subcategory.
414.51 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).
414.52 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]
414.53 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).
414.54 New source performance standards (NSPS).
414.55 Pretreatment standards for existing sources (PSES).
414.56 Pretreatment standards for new sources (PSNS).

Subpart F—Commodity Organic Chemicals

414.60 Applicability; description of the commodity organic chemicals subcategory.
414.61 Effluent limitations representing the degree of effluent reduction attainable

by the application of the best practicable control technology currently available (BPT).
414.62 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]
414.63 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
414.64 New source performance standards (NSPS).
414.65 Pretreatment standards for existing sources (PSES).
414.66 Pretreatment standards for new sources (PSNS).

Subpart G—Bulk Organic Chemicals

414.70 Applicability; description of the bulk organic chemicals subcategory.
414.71 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).
414.72 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]
414.73 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).
414.74 New source performance standards (NSPS).
414.75 Pretreatment standards for existing sources (PSES).
414.76 Pretreatment standards for new sources (PSNS).

Subpart H—Specialty Organic Chemicals

414.80 Applicability; description of the specialty organic chemicals subcategory.
414.81 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).
414.82 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]
414.83 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).
414.84 New source performance standards (NSPS).
414.85 Pretreatment standards for existing sources (PSES).
414.86 Pretreatment standards for new sources (PSNS).

Subpart I—Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment

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414.91 Toxic pollutant effluent limitations and standards for direct discharge point sources that use end-of-pipe biological treatment.

Subpart J—Direct Discharge Point Sources That Do Not Use End-of-Pipe Biological Treatment

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414.101 Toxic pollutant effluent limitations and standards for direct discharge point sources that do not use end-of-pipe biological treatment.

Subpart K—Indirect Discharge Point Sources

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414.111 Toxic pollutant standards for indirect discharge point sources.
APPENDIX A TO PART 414—NON-COMPLEXED METAL-BEARING WASTE STREAMS AND CYANIDE-BEARING WASTE STREAMS
APPENDIX B TO PART 414—COMPLEXED METAL-BEARING WASTE STREAMS

AUTHORITY: Secs. 301, 304, 306, 307, and 501, Pub. L. 92-500, 86 Stat. 816, Pub. L. 95-217, 91 Stat. 156, Pub. L. 100-4, 101 Stat. 7 (33 U.S.C. 1311, 1314, 1316, 1317, and 1361).

SOURCE: 52 FR 42568, Nov. 5, 1987, unless otherwise noted.

Subpart A—General

§414.10 General definitions.

As used in this part:

(a) Except as provided in this regulation, the general definitions, abbreviations and methods of analysis set forth in part 401 of this chapter shall apply to this part.

(b) *Pretreatment control authority* means:

(1) The POTW if the POTW's submission for its pretreatment program has

Effluent characteristics	NSPS [1]	
	Maximum for any one day	Maximum for monthly average
BOD5	64	24
TSS	130	40
pH	(2)	(2)

[1] All units except pH are milligrams per liter.
[2] Within the range of 6.0 to 9.0 at all times.

§414.25 Pretreatment standards for existing sources (PSES).

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve discharges in accordance with §414.111.

[58 FR 36892, July 9, 1993]

§414.26 Pretreatment standards for new sources (PSNS).

Except as provided in 40 CFR 403.7 any new source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve discharges in accordance with §411.111.

[58 FR 36892, July 9, 1993]

Subpart C—Other Fibers

§414.30 Applicability; description of the other fibers subcategory.

The provisions of this subpart are applicable to the process wastewater discharges resulting from the manufacture of products classified under SIC 2823 cellulosic man-made fibers, except Rayon, and SIC 2824 synthetic organic fibers including those fibers and fiber groups listed below. Product groups are indicated with an asterisk (*).

*Acrylic Fibers (85% Polyacrylonitrile)
*Cellulose Acetate Fibers
*Fluorocarbon (Teflon) Fibers
*Modacrylic Fibers
*Nylon 6 Fibers
Nylon 6 Monofilament
*Nylon 66 Fibers
Nylon 66 Monofilament
*Polyamide Fibers (Quiana)
*Polyaramid (Kevlar) Resin-Fibers
*Polyaramid (Nomex) Resin-Fibers
*Polyester Fibers
*Polyethylene Fibers
*Polypropylene Fibers
*Polyurethane Fibers (Spandex)

[52 FR 42568, Nov. 5, 1987, as amended at 57 FR 41844, Sept. 11, 1992]

§414.31 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Except as provided in 40 CFR 125.30 through 125.32, and in 40 CFR 414.11(i) for point sources with production in two or more subcategories, any existing point source subject to this subpart must achieve discharges not exceeding the quantity (mass) determined by multiplying the process wastewater flow subject to this subpart times the concentration listed in the following table.

Effluent characteristics	BPT effluent limitations [1]	
	Maximum for any one day	Maximum for monthly average
BOD5	48	18
TSS	115	36
pH	(2)	(2)

[1] All units except pH are milligrams per liter.
[2] Within the range of 6.0 to 9.0 at all times.

[52 FR 42568, Nov. 5, 1987, as amended at 57 FR 41844, Sept. 11, 1992]

§414.32 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]

§414.33 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

(a) The Agency has determined that for existing point sources whose total OCPSF production defined by §414.11 is less than or equal to five (5) million pounds of OCPSF products per year, the BPT level of treatment is the best available technology economically achievable. Accordingly, the Agency is not promulgating more stringent BAT limitations for these point sources.

(b) Except as provided in paragraph (a) of this section and in 40 CFR 125.30 through 125.32, any existing point source that uses end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with § 414.91 of this part.

(c) Except as provided in paragraph (a) of this section and in 40 CFR 125.30 through 125.32, any existing point source that does not use end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with § 414.101 of this part.

§ 414.34 New source performance standards (NSPS).

(a) Any new source that uses end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with § 414.91 of this part, and also must not exceed the quantity (mass) determined by multiplying the process wastewater flow subject to this subpart times the concentrations in the following table.

(b) Any new source that does not use end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with § 414.101 of this part, and also must not exceed the quantity (mass) determined by multiplying the process wastewater flow subject to this subpart times the concentrations in the following table.

Effluent characteristics	NSPS [1]	
	Maximum for any one day	Maximum for monthly average
BOD5	48	18
TSS	115	36
pH	(2)	(2)

[1] All units except pH are milligrams per liter.
[2] Within the range of 6.0 to 9.0 at all times.

§ 414.35 Pretreatment standards for existing sources (PSES).

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve discharges in accordance with § 414.111.

[58 FR 36892, July 9, 1993]

§ 414.36 Pretreatment standards for new sources (PSNS).

Except as provided in 40 CFR 403.7 any new source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve discharges in accordance with § 414.111.

[58 FR 36892, July 9, 1993]

Subpart D—Thermoplastic Resins

§ 414.40 Applicability; description of the thermoplastic resins subcategory.

The provisions of this subpart are applicable to the process wastewater discharges resulting from the manufacture of the products classified under SIC 28213 thermoplastic resins including those resins and resin groups listed below. Product groups are indicated with an asterisk (*).

*Abietic Acid—Derivatives
*ABS Resins
*ABS-SAN Resins
*Acrylate-Methacrylate Latexes
*Acrylic Latex
*Acrylic Resins
*Cellulose Acetate Butyrates
Cellulose Acetate Resin
*Cellulose Acetates
*Cellulose Acetates Propionates
Cellulose Nitrate
*Ethylene-Methacrylic Acid Copolymers
*Ethylene-Vinyl Acetate Copolymers
*Fatty Acid Resins
*Fluorocarbon Polymers
Nylon 11 Resin
*Nylon 6–66 Copolymers
*Nylon 6—Nylon 11 Blends
Nylon 6 Resin
Nylon 612 Resin
Nylon 66 Resin
*Nylons
*Petroleum Hydrocarbon Resins
*Polyvinyl Pyrrolidone—Copolymers
*Poly(Alpha)Olefins
Polyacrylic Acid
*Polyamides
*Polyarylamides
Polybutadiene
*Polybutenes
Polybutenyl Succinic Anhydride
*Polycarbonates
*Polyester Resins
*Polyester Resins, Polybutylene Terephthalate
*Polyester Resins, Polyoxybenzoate
Polyethylene
*Polyethylene—Ethyl Acrylate Resins

§414.82 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). [Reserved]

§414.83 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

(a) The Agency has determined that for existing point sources whose total OCPSF production defined by §414.11 is less than or equal to five (5) million pounds of OCPSF products per year, the BPT level of treatment is the best available technology economically achievable. Accordingly, the Agency is not promulgating more stringent BAT limitations for these point sources.

(b) Except as provided in paragraph (a) of this section and in 40 CFR 125.30 through 125.32, any existing point source that uses end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with §414.91 of this part.

(c) Except as provided in paragraph (a) of this section and in 40 CFR 125.30 through 125.32, any existing point source that does not use end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with §414.101 of this part.

§414.84 New source performance standards (NSPS).

(a) Any new source that uses end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with §414.9 of this part, and also must not exceed the quantity (mass) determined by multiplying the process wastewater flow subject to this subpart times the concentrations in the following table.

(b) Any new source that does not use end-of-pipe biological treatment and is subject to this subpart must achieve discharges in accordance with §414.101 of this part, and also must not exceed the quantity (mass) determined by multiplying the process wastewater flow subject to this subpart times the concentrations in the following table.

Effluent characteristics	NSPS [1]	
	Maximum for any one day	Maximum for monthly average
BOD5	120	45
TSS	183	57
pH	([2])	([2])

[1] All units except pH are milligrams per liter.
[2] Within the range of 6.0 to 9.0 at all times.

§414.85 Pretreatment standards for existing sources (PSES).

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve discharges in accordance with §414.111.

[58 FR 36892, July 9, 1993]

§414.86 Pretreatment standards for new sources (PSNS).

Except as provided in 40 CFR 403.7 any new source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve discharges in accordance with §414.111.

[58 FR 36892, July 9, 1993]

Subpart I—Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment

§414.90 Applicability; description of the subcategory of direct discharge point sources that use end-of-pipe biological treatment.

The provisions of this subpart are applicable to the process wastewater discharges resulting from the manufacture of the OCPSF products and product groups defined by §414.11 from any point source that uses end-of-pipe biological treatment or installs end-of-pipe biological treatment to comply with BPT effluent limitations.

§414.91 Toxic pollutant effluent limitations and standards for direct discharge point sources that use end-of-pipe biological treatment.

(a) Any point source subject to this subpart must achieve discharges not

exceeding the quantity (mass) determined by multiplying the process wastewater flow subject to this subpart times the concentrations in the following table.

(b) In the case of chromium, copper, lead, nickel, zinc, and total cyanide, the discharge quantity (mass) shall be determined by multiplying the concentrations listed in the following table for these pollutants times the flow from metal-bearing waste streams for the metals and times the flow from cyanide bearing waste streams for total cyanide. The metal-bearing waste streams and cyanide-bearing waste streams are defined as those waste streams listed in Appendix A of this part, plus any additional OCPSF process wastewater streams identified by the permitting authority on a case-by-case basis as metal or cyanide bearing based upon a determination that such streams contain significant amounts of the pollutants identified above. Any such streams designated as metal or cyanide bearing must be treated independently of other metal or cyanide bearing waste streams unless the permitting authority determines that the combination of such streams, prior to treatment, with the Appendix A waste streams will result in substantial reduction of these pollutants. This determination must be based upon a review of relevant engineering, production, and sampling and analysis information.

Effluent characteristics	Effluent limitations BAT and NSPS [1]	
	Maximum for any one day	Maximum for any monthly average
Acenaphthene	59	22
Acenaphthylene	59	22
Acrylonitrile	242	96
Anthracene	59	22
Benzene	136	37
Benzo(a)anthracene	59	22
3,4-Benzofluoranthene	61	23
Benzo(k)fluoranthene	59	22
Benzo(a)pyrene	61	23
Bis(2-ethylhexyl) phthalate	279	103
Carbon Tetrachloride	38	18
Chlorobenzene	28	15
Chloroethane	268	104
Chloroform	46	21
2-Chlorophenol	98	31
Chrysene	59	22
Di-n-butyl phthalate	57	27
1,2-Dichlorobenzene	163	77
1,3-Dichlorobenzene	44	31
1,4-Dichlorobenzene	28	15
1,1-Dichloroethane	59	22
1,2-Dichloroethane	211	68
1,1-Dichloroethylene	25	16
1,2-trans-Dichloroethylene	54	21
2,4-Dichlorophenol	112	39
1,2-Dichloropropane	230	153
1,3-Dichloropropylene	44	29
Diethyl phthalate	203	81
2,4-Dimethylphenol	36	18
Dimethyl phthalate	47	19
4,6-Dinitro-o-cresol	277	78
2,4-Dinitrophenol	123	71
2,4-Dinitrotoluene	285	113
2,6-Dinitrotoluene	641	255
Ethylbenzene	108	32
Fluoranthene	68	25
Fluorene	59	22
Hexachlorobenzene	28	15
Hexachlorobutadiene	49	20
Hexachloroethane	54	21
Methyl Chloride	190	86
Methylene Chloride	89	40
Naphthalene	59	22
Nitrobenzene	68	27
2-Nitrophenol	69	41
4-Nitrophenol	124	72
Phenanthrene	59	22
Phenol	26	15
Pyrene	67	25
Tetrachloroethylene	56	22
Toluene	80	26
Total Chromium	2,770	1,110
Total Copper	3,380	1,450
Total Cyanide	1,200	420
Total Lead	690	320
Total Nickel	3,980	1,690
Total Zinc [2]	2,610	1,050
1,2,4-Trichlorobenzene	140	68
1,1,1-Trichloroethane	54	21
1,1,2-Trichloroethane	54	21
Trichloroethylene	54	21
Vinyl Chloride	268	104

[1] All units are micrograms per liter.

[2] Total Zinc for Rayon Fiber Manufacture that uses the viscose process and Acrylic Fiber Manufacture that uses the zinc chloride/solvent process is 6,796 μg/l and 3,325 μg/l for maximum for any one day and maximum for monthly average, respectively.

[52 FR 42568, Nov. 5, 1987, as amended at 58 FR 36892, July 9, 1993]

Subpart J—Direct Discharge Point Sources That Do Not Use End-of-Pipe Biological Treatment

§ 414.100 Applicability; description of the subcategory of direct discharge point sources that do not use end-of-pipe biological treatment.

The provisions of this subpart are applicable to the process wastewater discharges resulting from the manufacture of the OCPSF products and product groups defined by § 414.11 from any

E. I. DU PONT DE NEMOURS & COMPANY

SPRUANCE PLANT
P.O. BOX 27001
RICHMOND, VIRGINIA 23261

MAY 1989
PRO

May 8, 1989

Mr. Ray R. Jenkins
Piedmont Regional Office
State Water Control Board
2201 West Broad Street
Richmond, Virginia 23220

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NPDES PERMIT NO. VA 0004669
OUTFALL 002 - BOD_5

Dear Mr. Jenkins:

This letter is written to document our meeting of 5/4/89 at which time R. A. Reich (DuPont Wastewater Treatment Consultant) and I discussed with you, J. R. Bell and Tom Modena recent high BOD_5 results at the DuPont Spruance Plant. At the conclusion of our meeting, you indicated that you would consult VWCB Headquarters as to the acceptability of utilizing a nitrification inhibitor in the BOD_5 analysis. DuPont with the aid of graphs and tables (attached) explained that such a change to its BOD_5 permit analysis for Outfall 002 is felt necessary to guard against potential future technical non-compliances for BOD_5 which may be artificially high due to the presence of nitrifing bacteria. In the course of our discussion we referenced to "Standard Methods for the Examination of Water and Wastewater" which indicates that use of a nitrifying inhibitor is desirable to correctly run the BOD_5 analysis. In essence this test is meant to identify only the carbonacious oxygen demand.

High BOD_5 was noted at DuPont Outfall 002 in early April, 1989. Timing for this occurrence is believed to have been associated with startup of air emission control scrubbers which were intended to remove particulate (hexamethylenediamine) from nylon reactor vent systems. By design these scrubber discharges were intended to be recycled back to the process. Because of instrumentation/process control concerns, the scrubber discharges were directed to the process sewer and site wastewater treatment facility. As soon as the likely association of high BOD_5 and reactor scrubber discharges was recognized (4/12/89) these streams were recycled back to the process.

Fearing that the Spruance Plant might exceed its BOD_5 monthly average permit limitation of 1001 pounds per day, you were notified 4/20/89. The Plant was able to stay within its permit limit but only thru significant curtailments in many plant operations for up to a week at month end. These included shutting down Kevlar® Polymer, Kevlar® Solvent Recovery, and James River Neutralization. Additionally, air conditioning systems throughout the Plant were cutoff to remove hydraulic load represented by water from those systems directed to waste treatment. Water users discontinued many housekeeping activities, converted to the use of the more expensive closed

loop chilled water system, and retained within their areas all hydraulic loads possible to prevent sending them to waste treatment before month end. Additionally, sluicing of the boiler bottom ash was greatly curtailed by converting boilers from coal to more expensive oil. In short this was a Plant-wide commitment to preserve permit compliance. Although these actions were judged by DuPont to be appropriate and necessary to maintain permit compliance, technically they appear to have been unnecessary. The high BOD_5 observed in the Site discharge was most likely artificially induced thru the presence of nitrifing bacteria present in much larger concentrations than in previous months due to larger quantities of organic nitrogen entering the treatment system. Other treatment parameters including total organic carbon (TOC) and TKN exhibited no significant changes at Outfall 002 indicating that outgoing water quality had not changed because the treatment system was adequate in biologically breaking down all pollutants to normal discharge levels.

DuPont feels that the change of its BOD_5 testing to include a nitrification inhibitor is both technically correct from an EPA testing criteria and prudent to not penalize DuPont simply for a testing anomaly which incorrectly characterizes the adequacy of its treatment system compatibility relative to treatment of nitrogen containing compounds. In essence the VWCB apparently agrees with this approach in that it plans within the next 2 years to incorporate $CBOD_5$ (BOD_5 with nitrification inhibitor) in the Spruance NPDES permit as a result of nutrient load allocations recently made law.

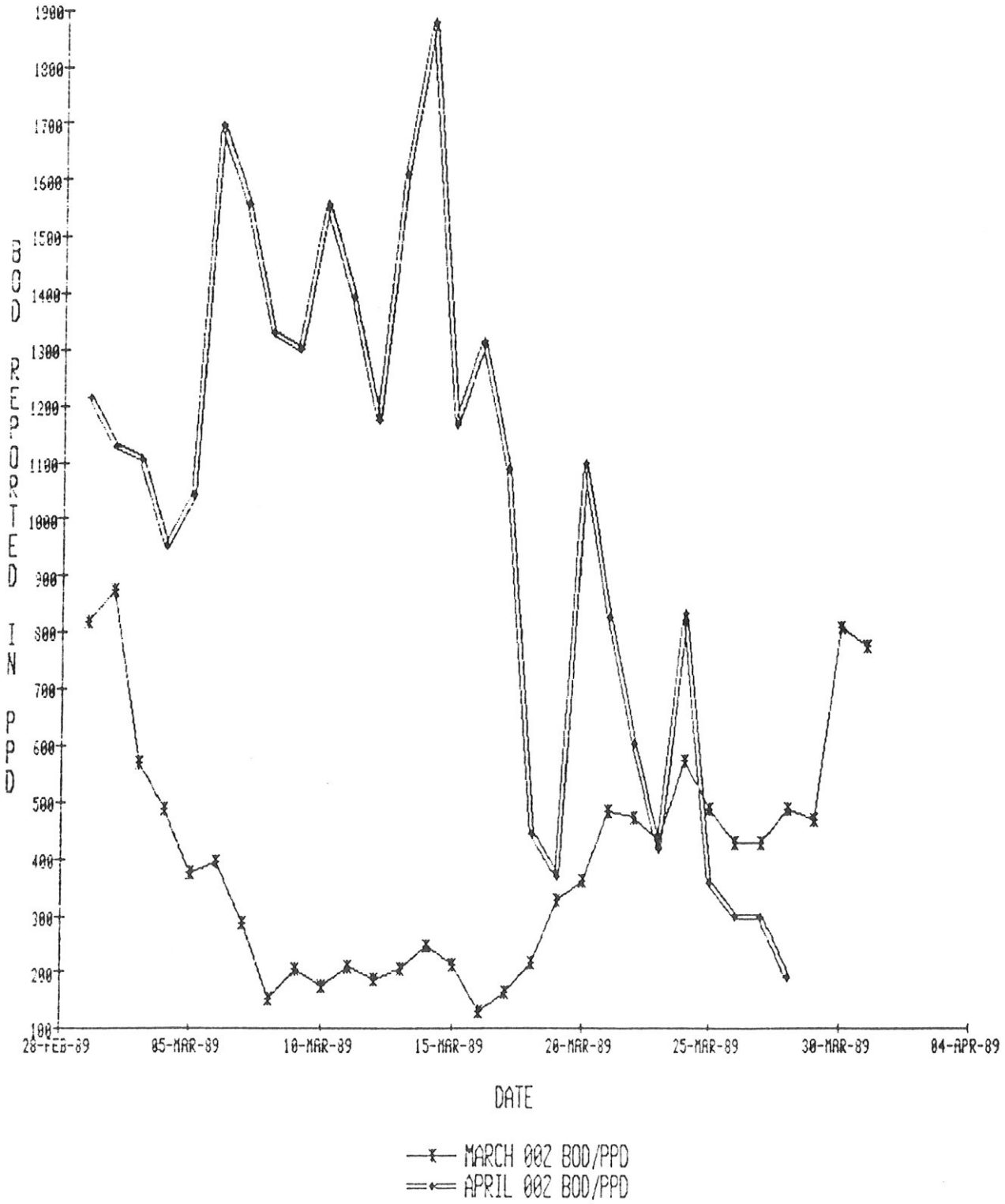
We would appreciate your earliest response to this request. Until we hear otherwise, Spruance will be analyzing both BOD_5 and $CBOD_5$ at Outfall 002.

Sincerely,

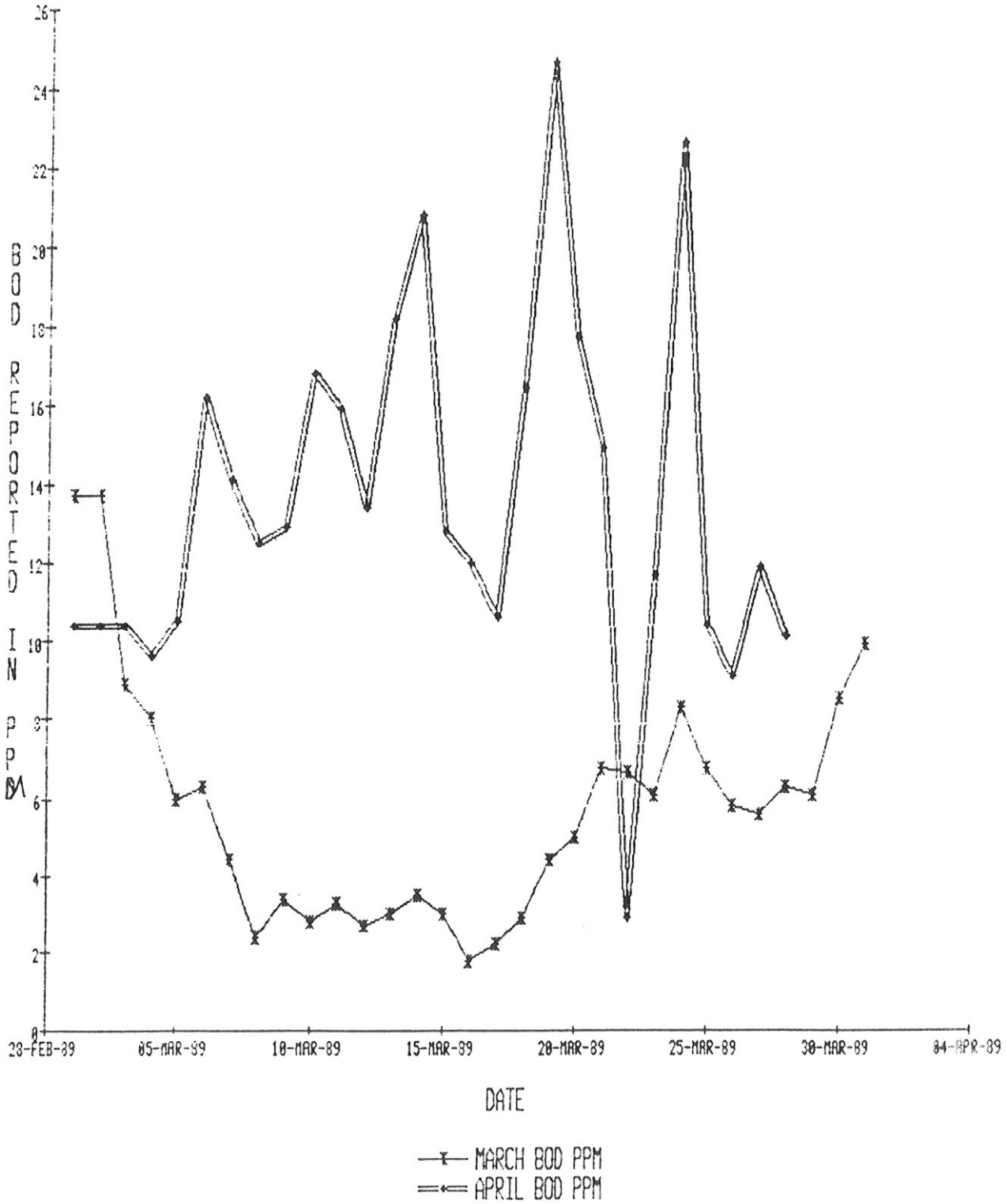
T. V. Robertson
Senior Research Chemist
Environmental Control

TVR:mcp
14:1.50
Attachments

BOD ON 002 FOR MARCH AND APRIL 1989--PPD



BOD ON 002 FOR MARCH AND APRIL 1989



TCM_TEST

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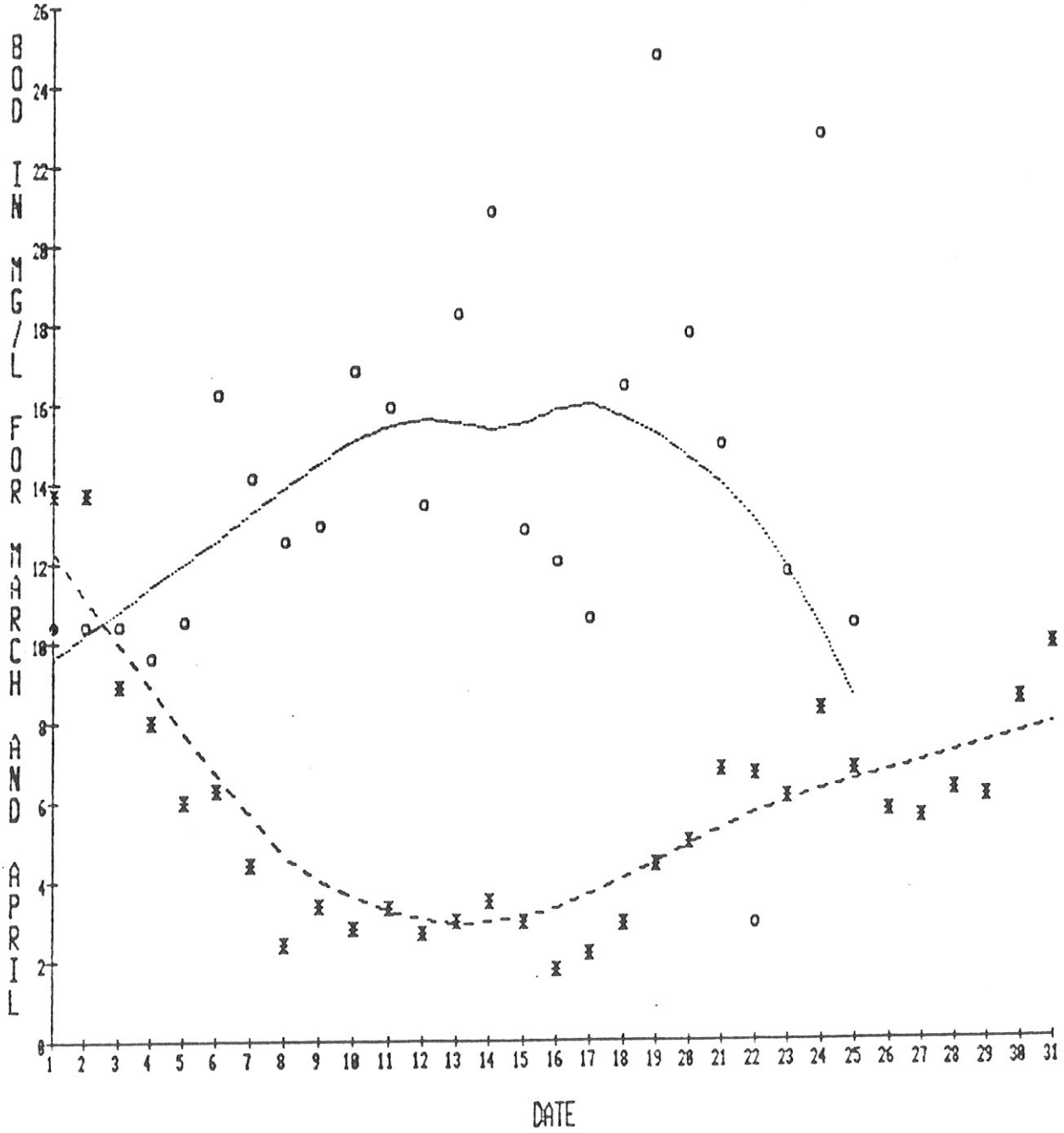
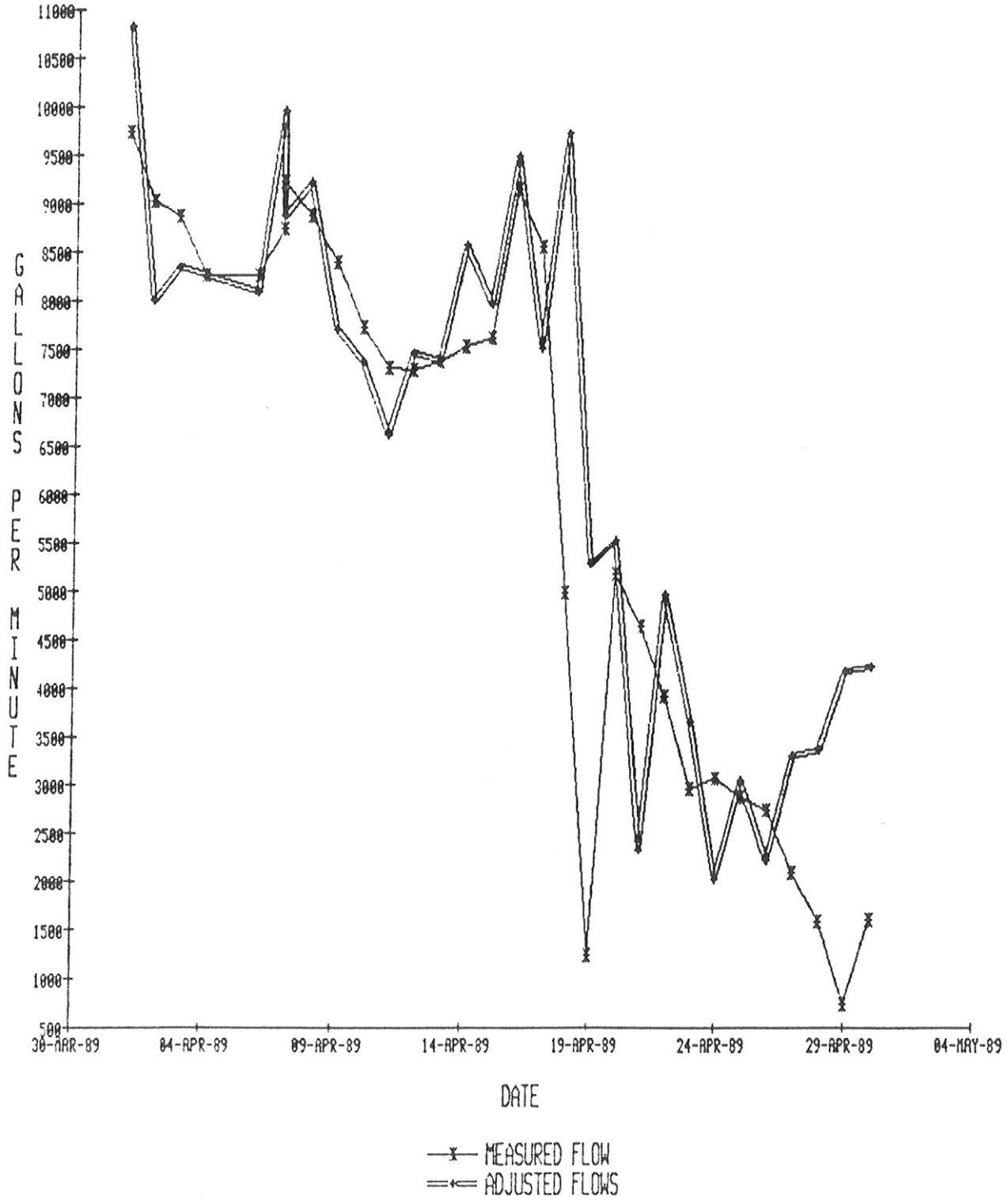
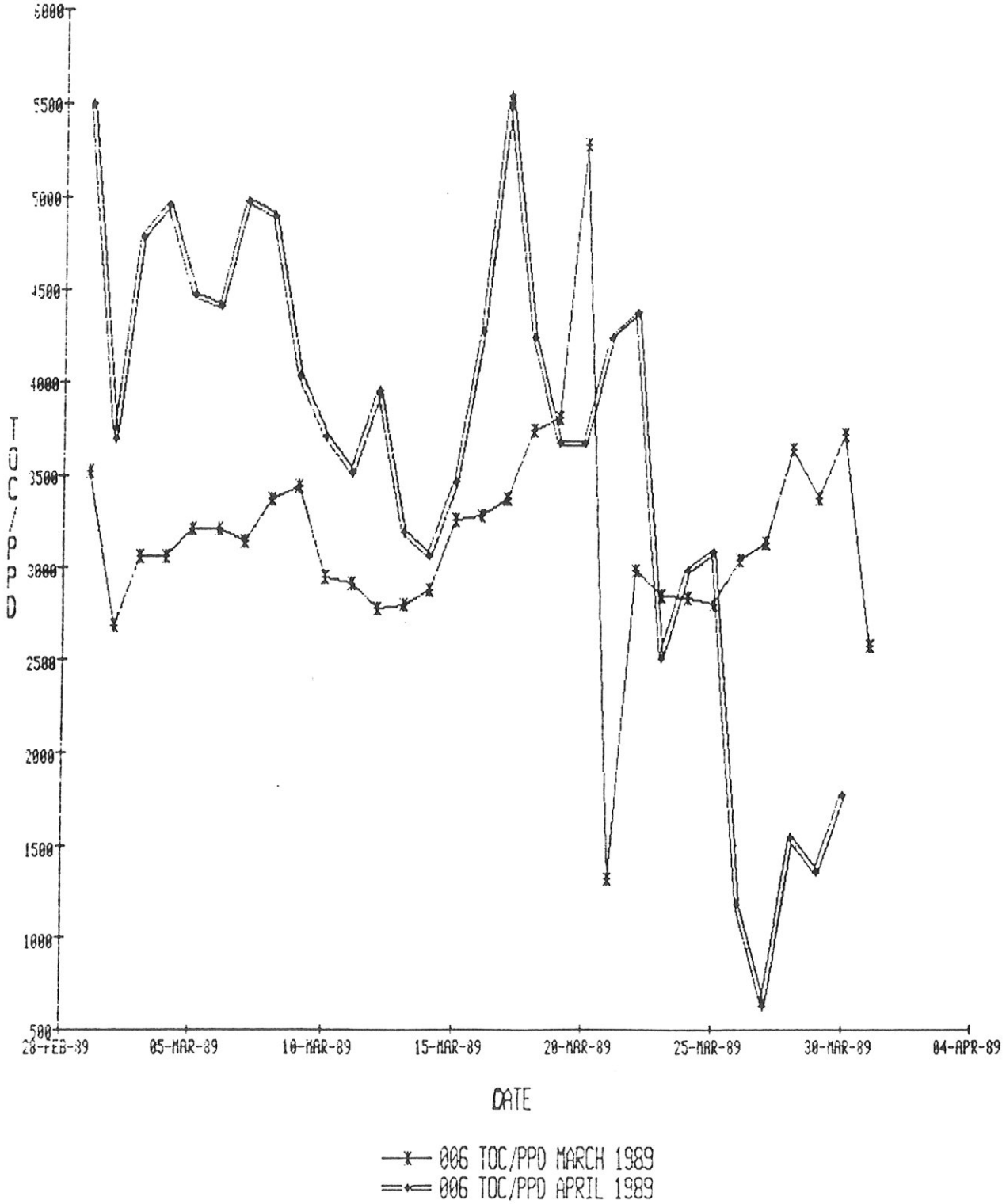
BOD MG/L FOR MARCH/APRIL 1989



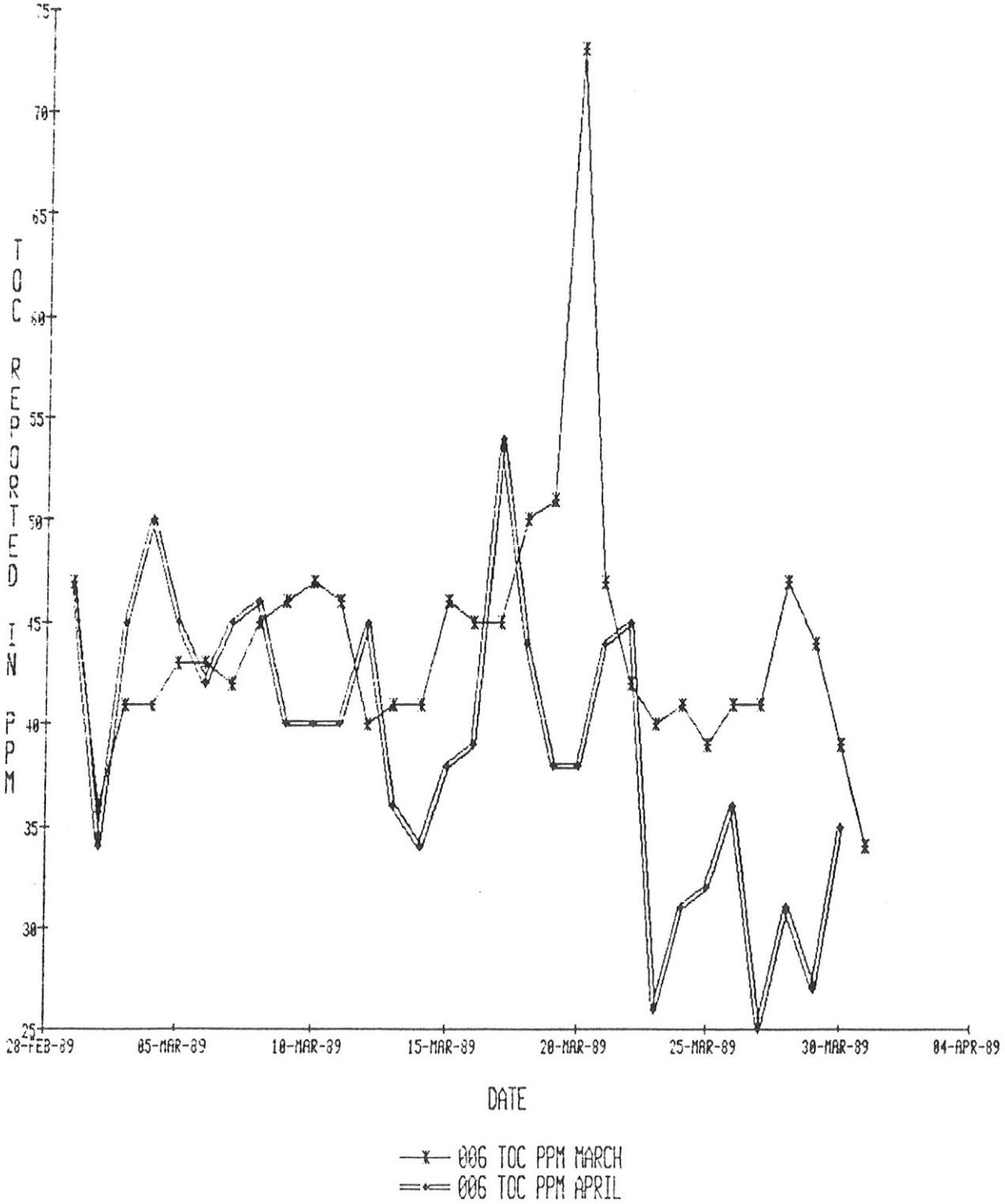
APRIL ADJUSTED VERSES MEASURED FLOW AT 006 (002)

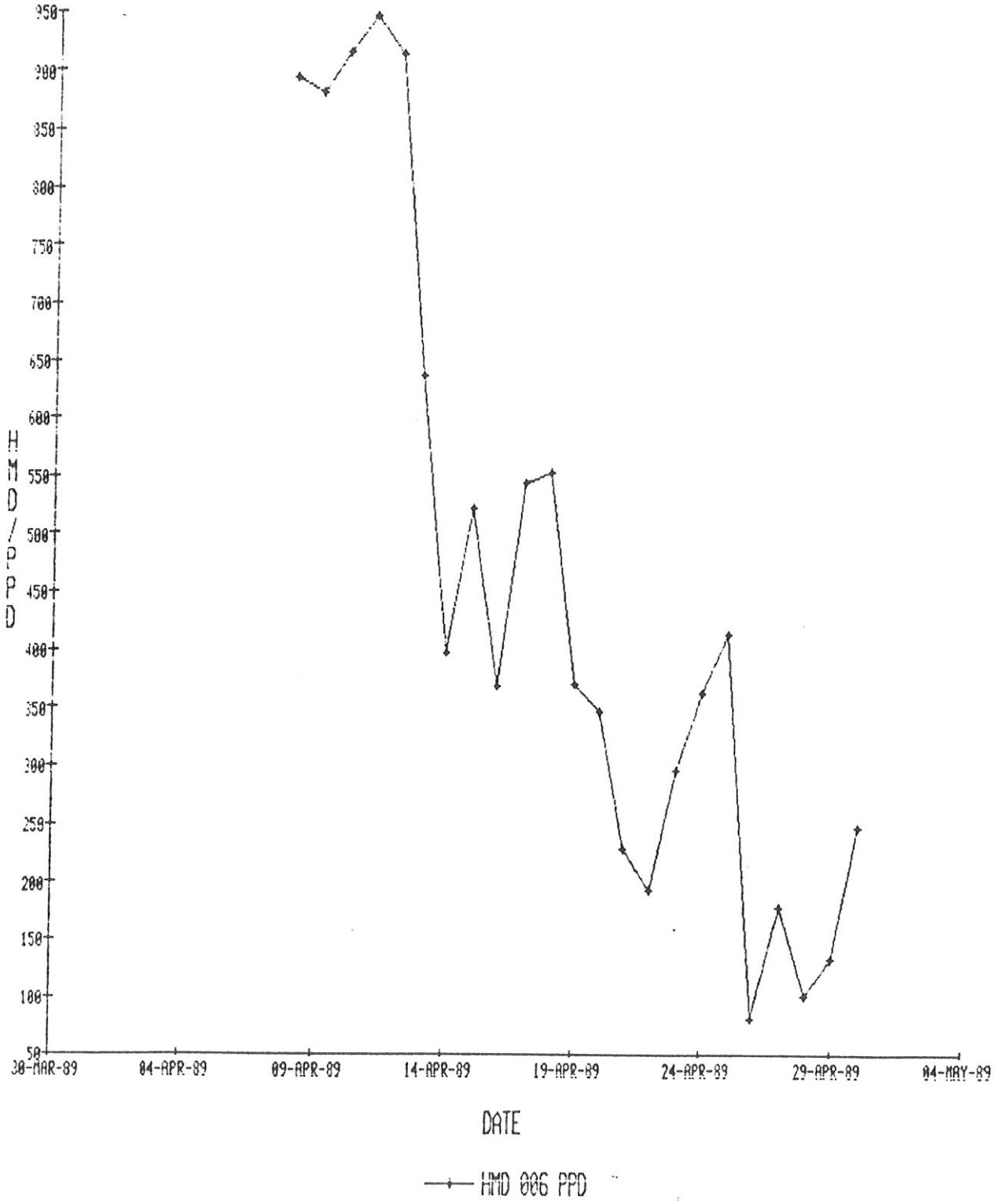


TOC REPORTED IN PPD FOR MARCH AND APRIL



TOC IN PPM ON 006 FOR MARCH APRIL 1989




HMD IN 006 PPD
HMD/PPD
950
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30-MAR-89
04-APR-89
09-APR-89
14-APR-89
19-APR-89
24-APR-89
29-APR-89
04-MAY-89
DATE
HMD 006 PPD

SPRUANCE
TOC & TKN OUTFALL 002

	AVG. FLOW (002) (MGPD)	TKN (AVG.) PPM	TKN (AVG.) LBS/DAY	TOC PPM	TOC LBS/DAY
12/87	8.8	3.7	257	18	1973
1/88	7.9	4.7	292	16	1043
2/88	8.4	<3.5	<232	18	1268
3/88	7.7	4.5	295	20	1297
4/88	8.0	3.85	262	19	1248
5/88	9.5	2.2	174	16	1723
6/88	12.8	2.9	294	15	1617
7/88	13.4	2.1	245	15	1623
8/88	13.3	1.6	175	14	1310
9/88	11.1	1.5	136	12	1015
10/88	10.1	1.2	103	14	1310
11/88	9.7	1.7	141	17	1362
12/88	8.6	3.8	259	16	1257
1/89	8.9	5.4	405	17	1299
2/89	8.3	6.8	429	24	1644
3/89	8.4	<1.3	<93	18	1271
4/89	8.6	2.1[3]	217[3]	19	1332

TKN LIMITS • 1497 LBS/DAY AVG
3 = DAYS DATA

14:1.49

TVR
5/4/89

WASTEWATER TREATMENT

	OUTFALL 006 (MG/L)						OUTFALL 002 (MG/L)						
DATE	TSS	BOD5	CBOD5	TKN	NH3	CHLOR-A*	TSS	BOD5	CBOD5	TKN	NH3	CHLOR-A*	ALGAE
4/20	54	44	38	16.8	1.13	31.0	12	18	6	10.7	1.89	81.6	5.5
4/24	41	52 (36)	15** (35)	9.5 (7.7)	1.89 (1.10)	9.7 (1.1)	65	25 (9)	12 (9)	7.0 (3.1)	1.82 (1.82)	85.2 (4.6)	5.7
4/25	58	29 (8)	21 (1.3)	2.4 (5.1)	3.66 (1.83)	0.6 (0.3)	20	7 (1.0)	7 (0.6)	2.7 (3.0)	1.96 (1.83)	92.4 (0.6)	6.2
4/26	30	20 (10)	22 (13)	5.9 (3.8)	1.23 (1.16)	0.7 (<0.1)	7	5 (1.5)	4 (1.2)	3.9 (2.7)	3.31 (2.45)	25.4 (1.7)	1.7
4/27	41	46 (27)	48 (29)	8.4 (6.8)	0.86 (1.51)	9.3 (1.8)	11	12 (4.0)	6 (2.0)	3.8 (3.3)	2.95 (2.51)	47.8 (5.7)	3.2
4/28		30 (7.0)	30 (4.0)					10 (1.8)	5 (1.6)				
4/29		34 (15)	26 (19)					6 (1.4)	2 (<.1)				

* = μg/l
** = UNABLE TO GET CONSISTENT RESULTS
( ) = SOLIDS REMOVED

14:1.43

APRILL 1989 BOD VERSES TSS MG/L

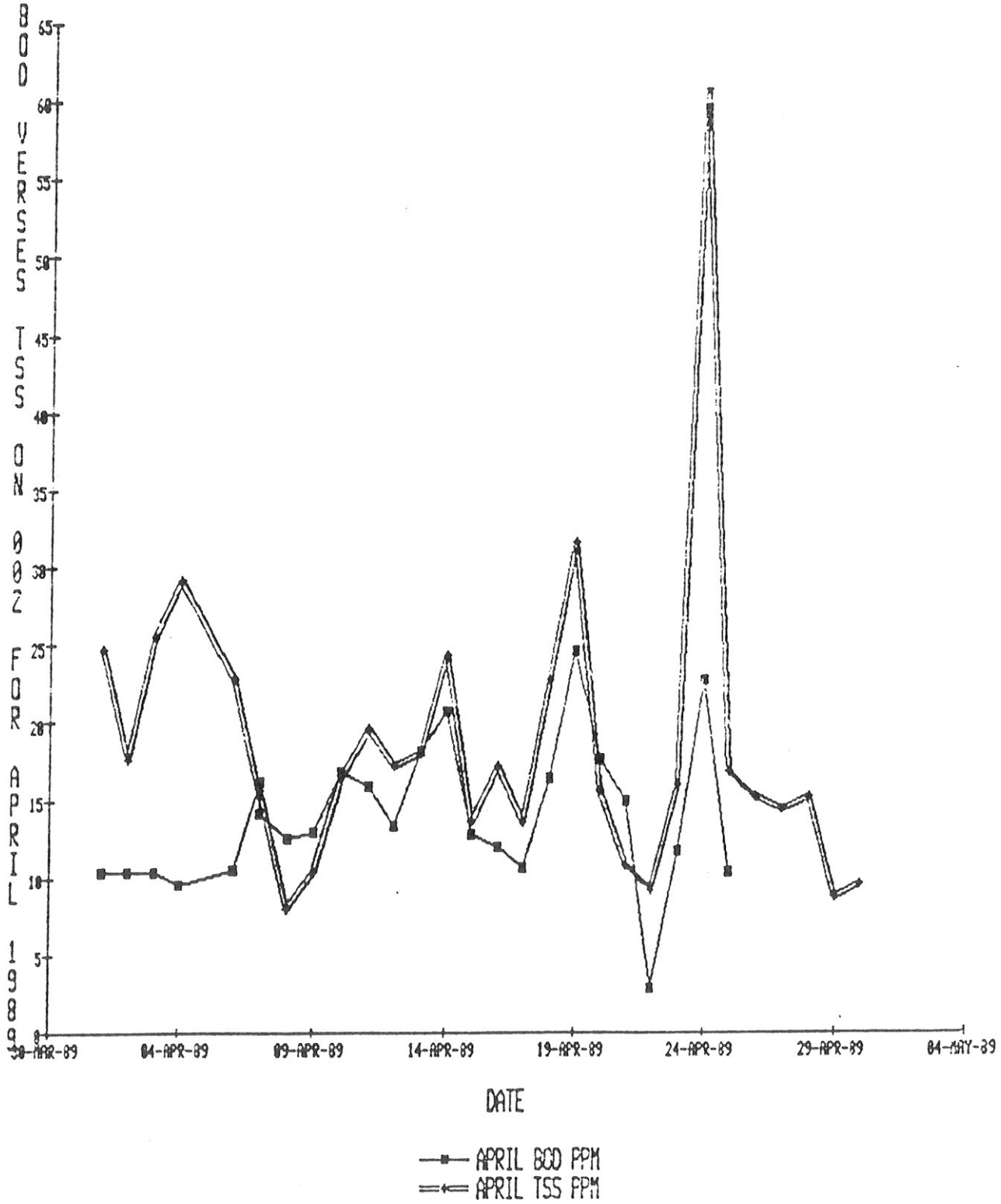

Table 3. Waste Load Allocations for the Year 1990.

		SUMMER (June - October)					WINTER (November - May)				
	FLOW	CBOD5		NH3-N[1,3]		DO[2]	CBOD5		NH3-N[1,3]		DO[2]
	(mgd)	(lbs/d)	(mg/l)	(lbs/d)	(mg/l)	(mg/l)	(lbs/d)	(mg/l)	(lbs/d)	(mg/l)	(mg/l)
City of Richmond STP	45.00	3002	8.0	2403	6.4	5.6	5367	14.3	5707	15.2	5.6
E.I. DuPont-Spruance	11.05	948		590		4.4	948		756		2.9
Falling Creek STP	10.10	1348	16.0	539	6.4	5.9	2023	24.0	1281	15.2	5.9
Proctor's Creek STP	12.00	1602	16.0	961	9.6	5.9	2403	24.0	1402	14.0	5.9
Reynolds Metals Company	0.49	172		8		6.5	172		8		6.5
Henrico STP	30.00	3002	12.0	2403	9.6	5.6	4756	19.0	3504	14.0	5.6
American Tobacco Company	2.70	715		113		5.8	715		113		5.8
ICI Americas, Inc.	0.20	167		8		5.8	167		8		3.1
Philip Morris - Park 500	2.20	819		92		4.6	819		92		4.6
Allied (Chesterfield)	53.00	1255		442		5.7	1255		442		5.7
Allied (Hopewell)	165.00	2750		10326		6.1	2750		10326		6.1
Hopewell Regional WTF	34.07	12502	44.0	10291	36.2	4.8	12502	44.0	10291	36.2	4.8
Petersburg STP	15.00	2802	22.4	801	6.4	5.0	2802	22.4	2028	16.2	5.0
TOTAL	380.81	31084		28978			36679		35958		

1 NH3-N values represent ammonia as nitrogen.
2 Dissolved oxygen limits represent average minimum allowable levels.
3 Allied (Hopewell) allocation may be redistributed to the Hopewell Regional WTF by VPDES permit.

ınk measurements daily.
be required are:
ık—Analyze organic-free
he blank should have less
ım detectable concentra-
›lank to insure that the
rocedures are not contrib-
X.
ank—Analyze GAC that
washed. Analyze duplicate
aily before sample analysis
ight sample pyrolyses.
blank—Analyze reagent
ne the blank for standards.
›le organic halogen
organic-free, pre-purged.
determine the POX blank.
plicates: To evaluate ran-
: replicates of each sample.
able control limits.

net organic chloride con-
h filtered replicate of each
ıdard:

$$\frac{: - C_1 + C_2 - C_4}{V}$$

Cl^- on the first column or filter.

Cl^- on the second column or
g,
method blanks on the same day
ıe instrument, µg Cl^-,
cted net organic Cl^- of filtered
µg organic Cl^-/L, and
of sample filtered, L.

calculate net purgeable or-
ent (P_3):

$$P_3 = \frac{P_1 - P_2}{V}$$

purgeable organic Cl^-, µg,
›urgeable organic Cl^-, µg,

P_1 = uncorrected net purgeable organic Cl^-, µg Cl^-/L, and
V = volume of sample or standard purged, L.

Determine the linear regression of instrument calibration standard curves for each instrument configuration. Update this linear regression daily by including the standard points analyzed on that day. Calculate the corrected organic chloride concentration for each replicate of each sample by substituting the net organic chloride content (C_4 or P_3) of each sample replicate into the appropriate linear regression equation.

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507 OXYGEN DEMAND (BIOCHEMICAL)*

1. Discussion

The biochemical oxygen demand (BOD) determination is an empirical test in which standardized laboratory procedures are used to determine the relative oxygen requirements of wastewaters, effluents, and polluted waters. The test measures the oxygen required for the biochemical degradation of organic material (carbonaceous demand) and the oxygen used to oxidize inorganic material such as sulfides and ferrous iron. It also may measure the oxygen used to oxidize reduced forms of nitrogen (nitrogenous demand) unless their oxidation is prevented by an inhibitor.

The method consists of placing a sample in a full, airtight bottle and incubating the bottle under specified conditions for a specific time. Dissolved oxygen (DO) is measured initially and after incubation. The BOD is computed from the difference between initial and final DO.

The bottle size, incubation temperature, and incubation period are all specified. Most wastewaters contain more oxygen-demanding materials than the amount of DO available in air-saturated water. Therefore, it is necessary to dilute the sample before incubation to bring the oxygen demand and supply into appropriate balance. Because bacterial growth requires nutrients such as nitrogen, phosphorus, and trace metals, these are added to the dilution water, which is buffered to ensure that the pH of the incubated sample remains in a

*Approved by Standard Methods Committee, 1981.

range suitable for bacterial growth. Complete stabilization of a sample may require a period of incubation too long for practical purposes; therefore, 5 d has been accepted as the standard incubation period.

Measurements of BOD that include both carbonaceous oxygen demand and nitrogenous oxygen demand generally are not useful; therefore, where appropriate, an inhibiting chemical may be used to prevent ammonia oxidation.[1] With this technique carbonaceous and nitrogenous demands can be measured separately. The inclusion of ammonia in the dilution water demonstrates that there is no intent to include the oxygen demand of reduced nitrogen forms in the BOD test. If this ammonia were oxidized, errors would result because the oxygen use would not be due exclusively to pollutants in the sample.

The extent of oxidation of nitrogenous compounds during the 5-d incubation period depends on the presence of microorganisms capable of carrying out this oxidation. Such organisms usually are not present in raw sewage or primary effluent in sufficient numbers to oxidize significant quantities of reduced nitrogen forms in the 5-d BOD test. Currently, many biological treatment plant effluents contain significant numbers of nitrifying organisms. Because oxidation of nitrogenous compounds can occur in such samples, inhibition of nitrification is recommended for samples of secondary effluent, for samples seeded with secondary effluent, and for samples of polluted waters.

The method included here contains both a dilution water check (*5b*) and a dilution water blank (*5h*). The dilution water check is to determine the acceptability of a particular batch of dilution water before it is used for BOD analysis. Seeded dilution waters are checked further for acceptable quality by measuring their consumption of oxygen from a known organic mixture, usually glucose and glutamic acid (*5c*).

The dilution water blank, made at the same time that samples are analyzed, provides a further quality control on dilution water at the time of analysis as well as on the cleanliness of apparatus such as BOD bottles.

The procedure for determining immediate oxygen demand (IDOD) has been eliminated because: (*a*) it was not clear whether IDOD should be reported in 5-d BOD data; (*b*) the measurement was inaccurate because of the small differences between initial DO and DO after 15 min; (*c*) arbitrary selection of 15 min for measuring IDOD did not necessarily include all short-term oxygen-consuming reactions; and (*d*) the IDOD is, in some instances, an iodine demand (during the DO determination) rather than a true DO demand. The methods outlined here require determining initial DO immediately after making the dilution. In this way all oxygen uptake (including that occurring during the first 15 min) is included in the BOD measurement.

Although only the 5-d BOD is described here, many variations of oxygen demand measurements exist. These include using shorter and longer incubation periods, tests to determine rates of oxygen uptake, continuous oxygen uptake measurements by respirometric techniques, etc.

2. Sampling and Storage

Samples for BOD analysis may degrade significantly during storage between collection and analysis, resulting in low BOD values. Minimize reduction of BOD by analyzing the sample promptly or by cooling it to near-freezing temperature during storage. However, even at low temperature, keep the holding time to a minimum. Warm the chilled samples to 20°C before analysis; some storage time can be used to accomplish this conveniently.

a. Grab samples: If analysis is begun within 2 h of collection, cooling is unnecessary. If analysis is not started within 2 h of sample collection, keep sample at or be-

Attachment J

Temperature Limitation Evaluation

The temperature limitation in the permit reissued in 2002 is a daily maximum of 104 °F (40.0 °C). As flow and temperature at Outfall 001 are a function of season, it is necessary to evaluate temperature on a seasonal basis; historically the warmer weather periods experienced the highest flows and temperatures. Previously, the seasons were defined by the Richmond Crater Water Quality Management Plan as November – May being winter months and June – October being summer months; however, implementation of the new DO standards has changed the seasons. To determine the temperature limitation under the most conservative assumptions, both the previous and new seasonal periods were evaluated.

To determine the in-stream temperature after mixing, the following equation was used:

$$T_{mix} = \frac{Q_{effluent} x T_{effluent} + Q_{stream} x T_{stream}}{Q_{total}}$$

where T_{mix} = in-stream, temperature after mixing.
$Q_{effluent}$ = maximum 30-day average flow reported on DMRs submitted between June 2006 and June 2008 for the monitoring period spanning May 2006 through May 2008.
$T_{effluent}$ = effluent temperature; this value is the current, daily maximum limitation
Q_{stream} = freshwater 7Q10 of the James River (this value is not reflective of the tidal nature of the stream at the point of discharge); see Attachment C for the flow frequency.
T_{stream} = minimum, average upstream temperature observed during the period of consideration; see Attachment C for the ambient monitoring data.
$Q_{total} = Q_{stream} + Q_{effluent}$

Once the mixed temperature is calculated, the change in the stream temperature (ΔT) is determined using the following equation:

$$\Delta T = T_{mix} - T_{stream}$$

The evaluation of effluent temperature follows.

	Summer: June – October	Winter: November – May	Summer: June – January	Winter: February – May
$Q_{effluent}$	43.67 MGD	43.67 MGD	43.67 MGD	43.67 MGD
$T_{effluent}$	40.0 °C	40.0 °C	40.0 °C	40.0 °C
Q_{stream}	500 MGD	500 MGD	500 MGD	500 MGD
T_{stream}	16.33 °C	3.37 °C	3.37 °C	6.57 °C
Q_{total}	543.67 MGD	543.67 MGD	543.67 MGD	543.67 MGD
T_{mix}	18.23 °C	6.31 °C	6.31 °C	9.26 °C
ΔT	1.90 °C	2.94 °C	2.94 °C	2.69 °C

The Water Quality Standards allow 3°C change in temperature. As demonstrated above, the temperature limitations in the 2002 reissuance of this permit continue to be protective of the instream temperature WQS; therefore, the temperature limitation of 104 °F (40.0 °C) will be carried forward in this reissuance.

Attachment K

East Ditch Discussion

In 2004 DEQ staff became aware of news sources reporting on worker and community concerns regarding the use of perfluorooctanoic acid (PFOA; also know as C-8) at out-of-state DuPont production facilities. In 2006, DEQ received complaints from various groups about a discharge from the "East Ditch" to the Spruance Outfall 001 effluent channel (see Attachment B). This discharge enters the 001 channel at a point below the monitoring station for Outfall 001. The East Ditch is a surface channel that discharges ground water and surface runoff. Testing in May and June 2007 indicated a concentration of 3.9 µg/L PFOA in the East Ditch and concentrations ranging from 0.21 µg/L to 6.2 µg/L in springs in the general area of the East Ditch.

In November 1991, DuPont sampled their wastestream at several locations for PFOA. The raw wastewater entering the site treatment plant was 22 ppb; the Outfall 001 concentration was 18 ppb.

The East Ditch was mentioned in DuPont's May 1992 Phase III Groundwater Assessment report on their ground water pump and treat system (see discussion in item 22.m of the fact sheet).

PFOA is a surfactant used in the production of Teflon. It makes up 15% of a liquid, raw ingredient known as the polytetrafluoroethylene (PTFE) dispersion for the Teflon process. Dispersion is produced at various out-of-state DuPont sites and was shipped to Spruance in liquid tote bins. Spruance used the dispersion from 1953 to 2004 (March 29, 2004) to produce a Teflon fiber.

Although there are conflicting opinions about the health significance of PFOA, DuPont hopes to stop using it by 2015.

The Spruance site is addressed by RCRA Permit VAD009305137 (see Attachment N) which addresses the cleanup of contaminant sources on the site. The ultimate disposition of the East Ditch will be addressed as part of the RCRA permit. In the interim, the East Ditch will be captured by constructing a collection sump and pumped into the Spruance wastewater treatment system. It is currently anticipated that construction of that system will be completed by September 2009. Additionally, the VPDES permit will include monitoring for PFOA on the treated, process wastewater discharge (Outfall 101) and on Outfall 001. Evaluation of the contaminants in the East Ditch discharge, after mixing with Outfall 001, indicated that the contaminant contributions from the Ditch do not cause any water quality standards to be violated. Virginia does not have a water quality standard for PFOA.

Attachment L

Stormwater Evaluation

DuPont has identified nine outfalls that discharge storm water (Outfalls 001 through 009). Outfall 001 is recognized as a combination of discharge process water from the plant and storm water. Outfalls 002 through 009 consist of storm water-only.

Monitoring at Outfall 001 has historically not differentiated between storm and dry weather flows, and consequently, the effluent limitations for this outfall have been based on flow and parameter data that include storm water. The 2008 permit reissuance, therefore, does not establish separate storm and dry weather sampling requirements.

The storm water from processing areas of the plant is collected and routed to the process wastewater treatment system through internal Outfall 101.

Outfalls 002 and 003 were the only storm water-only outfalls (Outfalls 002-009) that were required to be sampled over the current permit period (2002-2007) and for the application Form 2F. These two storm water outfalls are considered representative of the other storm water-only outfalls and will remain so for the 2008 permit reissuance.

The following items are included in this attachment and appear in the following order:

- Outfalls 002 & 003 Pollutant Screening for the 2008 Permit Reissuance
- Outfall 002 DMR Compilation (January 1995-March 2001)
- Outfalls 002 & 003 DMR Compilation (June 2002-October 2007)
- Outfalls 002 & 003 Form 2F Sampling Results (October 2006)
- MSTRANTI Data Source Report and MSTRANTI spreadsheets
- Substantially Identical SW Outfalls (from the permit reissuance application; this assessment has been revised since the 2002 permit reissuance)

Pollutant Screening Process

Current agency guidance (permitting manual) suggests screening the results of storm water sampling by comparing the data against values equivalent to 2X the acute aquatic standard for each relative parameter. MSTRANTI was used to calculated the applicable water quality standard. The parameters monitored by the permittee during the 2002-2007 permit period, and reported on application Form 2F, that are eligible for pollutant screening as explained above are: Ammonia, Chromium, Copper, Lead, Nickel, and Zinc. Parameters reported but not mentioned above were either: 1) reported below a quantitative limit (QL) consistent with DEQ requirements to be considered absent for the purpose of this evaluation, or 2) do not qualify for the screening process because an acute water quality standard does not exist for that particular parameter.

The table immediately following summarizes the findings of this evaluation and provides the rationale for requiring the Stormwater Management Evaluation Special Condition (Part I.G) in the permit.

Pollutant Screening Results

Outfall 002

	Pollutant	Monitoring/Testing Results		Acute Standard	2XAcute Standard	Stormwater Management Evaluation Required?
		Grab	Composite			
DMR's	Ammonia (mg/L)	0.72	NA	23.3	46.6	NO
	TR Chromium (µg/L)	4.4	NA	16	32	NO
	TR Lead (µg/L)	15	NA	45	90	NO
	TR Copper (µg/L)	25.3	NA	6.6	13.2	YES
	TR Nickel (µg/L)	6	NA	96	192	NO
	TR Zinc (µg/L)	405	NA	62	124	YES
	Dissolved Chromium (µg/L)	7.2	NA	16	32	NO
	Dissolved Lead (µg/L)	7.5	NA	45	90	NO
	Dissolved Copper (µg/L)	13	NA	6.6	13.2	NO
	Dissolved Nickel (µg/L)	<QL	NA	96	192	NO
	Dissolved Zinc (µg/L)	299.8	NA	62	124	YES
Form 2F	Ammonia (mg/L)	0.66	0.34	23.3	46.6	NO
	TR Chromium (mg/L)	0.002	0.001	0.016	0.032	NO
	TR Lead (mg/L)	0.006	0.003	0.045	0.09	NO
	TR Copper (mg/L)	0.011	0.012	0.0066	0.0132	NO
	TR Zinc (mg/L)	0.32	0.18	0.062	0.124	YES

Outfall 003

	Pollutant	Monitoring/Testing Results		Acute Standard	2XAcute Standard	Stormwater Management Evaluation Required?
		Grab	Composite			
DMR's	Ammonia (mg/L)	0.503	NA	23.3	46.6	NO
	TR Chromium (µg/L)	4	NA	16	32	NO
	TR Lead (µg/L)	5.8	NA	45	90	NO
	TR Copper (µg/L)	13.3	NA	6.6	13.2	YES
	TR Nickel (µg/L)	8.5	NA	96	192	NO
	TR Zinc (µg/L)	183.3	NA	62	124	YES
	Dissolved Chromium (µg/L)	2	NA	16	32	NO
	Dissolved Lead (µg/L)	3	NA	45	90	NO
	Dissolved Copper (µg/L)	9.6	NA	6.6	13.2	NO
	Dissolved Nickel (µg/L)	16	NA	96	192	NO
	Dissolved Zinc (µg/L)	155.8	NA	62	124	YES
Form 2F	Ammonia (mg/L)	0.43	<0.24	23.3	46.6	NO
	TR Chromium (mg/L)	0.005	0.003	0.016	0.032	NO
	TR Lead (mg/L)	0.009	0.005	0.045	0.09	NO
	TR Copper (mg/L)	0.008	0.009	0.0066	0.0132	NO
	TR Zinc (mg/L)	0.08	0.09	0.062	0.124	NO

NOTES:

* The parameter concentrations represented in the above charts within the "DMR's" sections were established by averaging the data reported for each parameter in DMR's submitted for permit compliance for the time period June 2002 - October 2007.

** A water quality standard does not exist for Total Chromium, only Chromium III and Chromium VI. In lieu of comparing the permittee's testing results to a Total Chromium Acute Standard, the lesser of 2X the Acute Standard for either Chromium III or Chromium VI was chosen. In this case, Chromium VI was chosen for both Outfalls.

*** Please note that all Form 2F test results were reported in mg/L rather than µg/L

**** Please see the attached MSTRANTI spreadsheets for Acute Standard derivation.

DMR Data Compilation for Outfall 002
January 1995 - March 2001

Outfall	*002*													
Storm Event Date	Rainfall Amount (in.)	Flow (Gal.)	pH (SU)	TSS (mg/L)	COD (mg/L)	Ammonia-N (mg/L)	TKN (mg/L)	Nitrate/Nitrite (mg/L)	Dis. Chromium (µg/L)	Dis. Lead (µg/L)	Dis. Copper (µg/L)	Dis. Nickel (µg/L)	Dis. Zinc (µg/L)	Oil & Grease (mg/L)
January 30, 1995	0.34	60526	6.94	7.0	30.4	0.64	3.10	0.85	0.90	<5.0	8.0	<5.0	590	2.00
June 6, 1995	0.15	26703	8.05	39.5	217.0	1.27	15.00	0.63	1.40	5.00	12.0	<5.0	90	1.14
December 18, 1995	0.50	89000	6.72	12.9	140.0	0.82	15.20	0.02	0.80	<5.0	6.0	<80	380	1.10
July 8, 1996	1.05	187000	5.00	58.0	38.4	0.41	2.57	0.90	<1.0	<5.0	12.5	<40	470	2.70
December 13, 1996	0.90	160700	6.00	17.0	24.1	0.45	0.80	0.50	<15	<5.0	<20	<5.0	167	<1.0
July 2, 1997	0.15	26714	5.80	52.0	96.9	0.84	2.11	1.96	<5.0	<11	<22	<5.0	260	2.00
January 8, 1998	0.60	106900	5.45	67.0	70.0	0.37	4.50	1.78	<5.0	8.00	6.0	<5.0	180	<1.0
June 29, 1998	0.75	133571	4.89	46.0	<30.0	0.49	1.20	0.60	2.50	4.00	14.0	<5.0	210	<1.0
January 3, 1999	1.30	231400	6.88	23.0	31.0	0.44	3.50	2.05	3.00	1.00	40.0	10.00	360	1.00
February 12, 1999	0.50	89010	6.42	39.0	61.0	0.32	1.50	0.73	1.70	4.00	10.0	<5	100	<1
July 28, 1999	0.25	45000	7.42	37.0	31.0	0.09	1.00	0.12	<20	<200	<20	<50	40	<5
March 11, 2000	0.80	142000	7.02	39.0	73.0	0.20	1.40	0.72	<20	<5	13.0	9.00	70	<1
August 27, 2000	1.50	267000	5.95	214.0	<30	0.50	0.80	0.04	1.40	1.00	9.0	<5	100	1.00
March 20, 2001	0.25	45000	6.68	14.0	37.0	0.14	1.30	0.43	<1.0	2.00	4.0	<5	60	1.00
90%tile			7.3000	64.3000	135.6900	0.8340	11.8500	1.9060	2.7000	6.2000	14.0000	9.9000	443.0000	2.2100
10%tile			5.1350	13.2300	30.4600	0.1580	0.8600	0.0640	0.8600	1.0000	6.0000	9.1000	63.0000	1.0000
Average	0.6457	115037.4286	6.3729	47.5286	70.8167	0.4986	3.8557	0.8093	1.6714	3.5714	12.2273	9.5000	219.7857	1.4925

DMR Data Compilation for Outfall 002 & Outfall 003
June 2002 - October 2007

Outfall	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*
Date DMR Received	Flow (MG)	Flow (MG)	pH (SU)	pH (SU)	TSS (mg/L)	TSS (mg/L)	COD (mg/L)	COD (mg/L)	Ammonia-N (mg/L)	Ammonia-N (mg/L)	TKN (mg/L)	TKN (mg/L)
7/12/2002	0.031	0.065	7.43	6.88	25.0	20.0	56.0	42.0	0.80	0.87	2.4	1.10
7/11/2003	0.035	0.075	6.42	6.14	14.0	66.0	31.0	52.0	0.75	0.21	1.7	1.30
6/14/2004	0.192	0.407	6.01	5.67	64.0	51.0	46.0	51.0	0.20	0.25	1.0	1.10
8/11/2005 (1)	0.0230	0.0490	6.15	5.90	9.0	47.0	65.0	102.0	1.16	0.76	2.9	3.00
11/14/2006 (2)	0.9273	2.0355	6.90	6.00	18.8	122.3	34.0	36.0	0.54	0.35	0.7	<0.5
11/13/2007	0.0760	0.1629	6.50	5.30	112.0	40.0	32.0	69.0	0.86	0.58	1.6	1.30
90%tile			7.1650	6.5100	88.0000	94.1500	60.5000	85.5000	1.0100	0.8150	2.6500	2.3200
10%tile			6.0800	5.4850	11.5000	30.0000	31.5000	39.0000	0.3700	0.2300	0.8500	1.1000
Average	0.2141	0.4657	6.5683	5.9817	40.4667	57.7167	44.0000	58.6667	0.7183	0.5033	1.7167	1.5600

Outfall	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*
Date DMR Received	TPH (mg/L)	TPH (mg/L)	Nitrate/Nitrite (mg/L)	Nitrate/Nitrite (mg/L)	TR Chromium (µg/L)	TR Chromium (µg/L)	Dis. Chromium (µg/L)	Dis. Chromium (µg/L)	TR Lead (µg/L)	TR Lead (µg/L)	Dis. Lead (µg/L)	Dis. Lead (µg/L)
7/12/2002	<1.00	<1.00	1.28	0.82	4.40	4.00	3.40	<2.50	1.00	1.00	14.00	2.00
7/11/2003	<1.00	2.00	0.70	0.25	1.00	1.00	<1.00	1.00	6.00	8.00	1.00	4.00
6/14/2004	<1.00	<1.00	1.24	1.09	<5.00	<5.000	<5.00	<5.00	<5.00	<5.000	<5.0	<5.0
8/11/2005 (1)	1.00	<1.00	6.06	2.40	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00
11/14/2006 (2)	<1.10	<1.10	0.96	0.74	2.00	5.00	<1.00	<1.00	6.00	9.00	<1.00	<1.00
11/13/2007	<5.00	<5.0	1.02	1.02	10.00	6.00	11.00	3.00	47.00	5.00	<5.00	<5.00
90%tile	1.0000	2.0000	3.6700	1.7450	8.3200	5.7000	10.2400	2.8000	34.7000	8.7000	12.7000	3.8000
10%tile	1.0000	2.0000	0.8300	0.4950	1.3000	1.9000	4.1600	1.2000	2.5000	2.2000	2.3000	2.2000
Average	1.0000	2.0000	1.8767	1.0533	4.3500	4.0000	7.2000	2.0000	15.0000	5.7500	7.5000	3.0000

Outfall	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*	*002*	*003*
Date DMR Received	TR Copper (µg/L)	TR Copper (µg/L)	Dis. Copper (µg/L)	Dis. Copper (µg/L)	TR Nickel (µg/L)	TR Nickel (µg/L)	Dis. Nickel (µg/L)	Dis. Nickel (µg/L)	TR Zinc (µg/L)	TR Zinc (µg/L)	Dis. Zinc (µg/L)	Dis. Zinc (µg/L)
7/12/2002	39.0	7.0	26.0	6.0	6.0	7.0	<5.0	16.0	670.0	70.0	580.0	80.0
7/11/2003	10.0	13.0	6.0	9.0	<5.00	<5.00	<5.0	<5.0	240.0	70.0	19.0	5.0
6/14/2004	12.0	12.0	9.0	10.0	<5.00	<5.000	<5.0	<5.0	50.0	50.0	30.0	30.0
8/11/2005 (1)	40.0	30.0	20.0	20.0	<10.00	10.0	<10.00	<10.00	470.0	730.0	460.0	700.0
11/14/2006 (2)	11.0	8.0	7.0	3.0	<5.00	<5.00	<5.00	<5.00	320.0	80.0	250.0	40.0
11/13/2007	40.0	10.0	10.0	<10.000	<10.000	<10.000	<10.000	<10.000	680.0	100.0	460.0	80.0
90%tile	40.0000	21.5000	23.0000	16.0000	6.0000	9.7000	#NUM!	16.0000	675.0000	415.0000	520.0000	390.0000
10%tile	10.5000	7.5000	6.5000	4.2000	6.0000	7.3000	#NUM!	16.0000	145.0000	60.0000	24.5000	17.5000
Average	25.3333	13.3333	13.0000	9.6000	6.0000	8.5000	#DIV/0!	16.0000	405.0000	183.3333	299.8333	155.8333

Footnote (1) The data reported for metals for both Outfalls 002 and 003 on the DMR's received August 11, 2005 were in concentration units of mg/L rather than µg/L. The permittee resubmitted the DMR's for both Outfalls on October 12, 2005 with the corrected units. The data contained in this table reflects the corrected concentration units for that respective monitoring period.

Footnote (2) The data reported for metals for both Outfalls 002 and 003 on the DMR's received November 14, 2006 were in concentration units of mg/L rather than µg/L. The permittee resubmitted the DMR's for both Outfalls on November 12, 2007 with the corrected units. The data contained in this table reflects the corrected concentration units for that respective monitoring period.

Stormwater Data Reported in Form 2F - October 2006

Outfall 002		
Parameter	Concentration Test Results for Parameters listed in Form 2F	
	Grab	Composite
TSS (mg/L)	18.8	11.5
pH (SU)	6.9	NA
TR Zinc (mg/L)	0.32	0.18
TR Chromium (mg/L)	0.002	0.001
Total Ammonia (mg/L)	0.66	0.34
Nitrate/Nitrite (mg/L)	0.96	0.49
TKN (mg/L)	0.69	<0.50
Total Nitrogen (mg/L)	1.65	<0.99
Biological Oxygen Demand (mg/L)	2.9	6.9
Chemical Oxygen Demand (mg/L)	41	34
TR Lead (mg/L)	0.006	0.003
TR Copper (mg/L)	0.011	0.012
Storm Event Date	October 6, 2006	
Duration	2,790 minutes	
Total Rainfall	5.75 inches	
Flow	32,231 gpm	
Total Flow	37.21 MG	

Outfall 003		
Parameter	Concentration Test Results for Parameters listed in Form 2F	
	Grab	Composite
TSS (mg/L)	122.3	33.2
pH (SU)	6	NA
TR Zinc (mg/L)	0.08	0.09
TR Chromium (mg/L)	0.005	0.003
Total Ammonia (mg/L)	0.43	<0.24
Nitrate/Nitrite (mg/L)	0.74	0.98
TKN (mg/L)	<0.50	<1.24
Total Nitrogen (mg/L)	<1.24	<1.48
Biological Oxygen Demand (mg/L)	6.3	7.5
Chemical Oxygen Demand (mg/L)	36	34
TR Lead (mg/L)	0.009	0.005
TR Copper (mg/L)	0.008	0.009
Storm Event Date	October 6, 2006	
Duration	2,790 minutes	
Total Rainfall	5.75 inches	
Flow	803 gpm	
Total Flow	0.93 MG	

Notes:

* Parameters that require testing in Form 2F that are not listed in the tables above were reported at concentrations less than a test quantification level (QL) consistent with DEQ requirements to be considered absent for the purpose of this evaluation.

** Please note that the data contained in the application Form 2F were also used to comply with the annual monitoring requirements in the current permit and were submitted in the October 2006 DMR (received on November 14, 2006)

MSTRANTI Data Sources: Stormwater Evaluation

Stream Information	
Mean Hardness	BEJ - Data collected from a stream of similar location and size (Goodes Creek at Station 2-GOD000.77) were used.
90% Temperature (annual)	
90% Temperature (wet season)	
90% Maximum pH	
10% Maximum pH	
Tier Designation	Flow frequency analysis for Grindall Creek
Stream Flows	
All Data	Flow frequency analysis for Grindall Creek
Mixing Information	
All Data	Set to 100% to calculated the water quality standards based on instream conditions
Effluent Information	
Mean Hardness	Established at the same level as the stream to determine instream water quality standards
90% Temperature (annual)	
90% Maximum pH	
10% Maximum pH	
Discharge Flow	N/A – effluent flow is only needed when determining a WLA; a flow of 1 MGD use used to force the program

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: DuPont Spruance - Outfall 002/003 Permit No.: VA0004669

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

Stream Information

Mean Hardness (as CaCO3) =	47	mg/L
90% Temperature (Annual) =	25.2	deg C
90% Temperature (Wet season) =	25.2	deg C
90% Maximum pH =	7.39	SU
10% Maximum pH =	6.69	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0.02	MGD
7Q10 (Annual) =	0.02	MGD
30Q10 (Annual) =	0.03	MGD
1Q10 (Wet season) =	0	MGD
30Q10 (Wet season)	0	MGD
30Q5 =	0.06	MGD
Harmonic Mean =	0.17	MGD
Annual Average =	N/A	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) =	47	mg/L
90% Temp (Annual) =	25.2	deg C
90% Temp (Wet season) =	25.2	deg C
90% Maximum pH =	7.39	SU
10% Maximum pH =	6.69	SU
Discharge Flow =	1	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	2.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+03**
Acrolein	0	--	--	na	7.8E+02	--	--	na	8.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.3E+02**
Acrylonitrile[c]	0	--	--	na	6.6E+00	--	--	na	7.7E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.7E+00**
Aldrin [c]	0	3.0E+00	--	na	1.4E-03	3.1E+00	--	na	1.6E-03	--	--	--	--	--	--	--	--	**3.1E+00**	**--**	**na**	**1.6E-03**
Ammonia-N (mg/l) (Yearly)	0	2.33E+01	2.40E+00	na	--	2.4E+01	2.5E+00	na	--	--	--	--	--	--	--	--	--	**2.4E+01**	**2.5E+00**	**na**	**--**
Ammonia-N (mg/l) (High Flow)	0	2.33E+01	2.40E+00	na	--	2.3E+01	2.4E+00	na	--	--	--	--	--	--	--	--	--	**2.3E+01**	**2.4E+00**	**na**	**--**
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**
Antimony	0	--	--	na	4.3E+03	--	--	na	4.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.6E+03**
Arsenic	o	3.4E+02	1.5E+02	na	--	3.5E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	**3.5E+02**	**1.5E+02**	**na**	**--**
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Benzene [c]	0	--	--	na	7.1E+02	--	--	na	8.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.3E+02**
Benzidine[c]	0	--	--	na	5.4E-03	--	--	na	6.3E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.3E-03**
Benzo (a) anthracene [c]	0	--	--	na	4.9E-01	--	--	na	5.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.7E-01**
Benzo (b) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	5.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.7E-01**
Benzo (k) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	5.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.7E-01**
Benzo (a) pyrene [c]	0	--	--	na	4.9E-01	--	--	na	5.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.7E-01**
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.5E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+01**
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.8E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+05**
Bromoform [c]	0	--	--	na	3.6E+03	--	--	na	4.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.2E+03**
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.5E+03**
Cadmium	0	1.7E+00	6.3E-01	na	--	1.7E+00	6.4E-01	na	--	--	--	--	--	--	--	--	--	**1.7E+00**	**6.4E-01**	**na**	**--**
Carbon Tetrachloride [c]	0	--	--	na	4.4E+01	--	--	na	5.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E+01**
Chlordane [c]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.4E-03	na	2.6E-02	--	--	--	--	--	--	--	--	**2.4E+00**	**4.4E-03**	**na**	**2.6E-02**
Chloride	0	8.6E+05	2.3E+05	na	--	8.8E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	**8.8E+05**	**2.3E+05**	**na**	**--**
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	**na**	**--**
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E+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	--	--	na	3.4E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	--	--	na	4.0E+02
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	3.4E+04	--	--	--	--	--	--	--	--	--	--	na	3.4E+04
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	4.6E+03	--	--	--	--	--	--	--	--	--	--	na	4.6E+03
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	--	--	na	4.2E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.5E-02	4.2E-02	na	--	--	--	--	--	--	--	--	--	8.5E-02	4.2E-02	na	--
Chromium III	0	3.1E+02	4.0E+01	na	--	3.1E+02	4.1E+01	na	--	--	--	--	--	--	--	--	--	3.1E+02	4.1E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	5.7E-01	--	--	--	--	--	--	--	--	--	--	na	5.7E-01
Copper	0	6.6E+00	4.7E+00	na	--	6.7E+00	4.8E+00	na	--	--	--	--	--	--	--	--	--	6.7E+00	4.8E+00	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+01	5.3E+00	na	2.3E+05	--	--	--	--	--	--	--	--	2.2E+01	5.3E+00	na	2.3E+05
DDD [C]	0	--	--	na	8.4E-03	--	--	na	9.8E-03	--	--	--	--	--	--	--	--	--	--	na	9.8E-03
DDE [C]	0	--	--	na	5.9E-03	--	--	na	6.9E-03	--	--	--	--	--	--	--	--	--	--	na	6.9E-03
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+00	1.0E-03	na	6.9E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	na	6.9E-03
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	5.7E-01	--	--	--	--	--	--	--	--	--	--	na	5.7E-01
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	na	1.3E+04
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	1.9E+04
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	9.0E-01	--	--	--	--	--	--	--	--	--	--	na	9.0E-01
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	5.4E+02	--	--	--	--	--	--	--	--	--	--	na	5.4E+02
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	--	--	na	1.2E+03
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	1.5E+05	--	--	--	--	--	--	--	--	--	--	na	1.5E+05
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	8.4E+02	--	--	--	--	--	--	--	--	--	--	na	8.4E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	4.6E+02	--	--	--	--	--	--	--	--	--	--	na	4.6E+02
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.8E+03	--	--	--	--	--	--	--	--	--	--	na	1.8E+03
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E-01	5.7E-02	na	1.6E-03	--	--	--	--	--	--	--	--	2.4E-01	5.7E-02	na	1.6E-03
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	1.3E+05	--	--	--	--	--	--	--	--	--	--	na	1.3E+05
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	6.9E+01	--	--	--	--	--	--	--	--	--	--	na	6.9E+01
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	2.4E+03	--	--	--	--	--	--	--	--	--	--	na	2.4E+03
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	3.1E+06	--	--	--	--	--	--	--	--	--	--	na	3.1E+06
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	na	1.3E+04
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	1.5E+04	--	--	--	--	--	--	--	--	--	--	na	1.5E+04
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	8.1E+02	--	--	--	--	--	--	--	--	--	--	na	8.1E+02
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	1.1E+02	--	--	--	--	--	--	--	--	--	--	na	1.1E+02
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	--	--	na	na
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	6.3E+00	--	--	--	--	--	--	--	--	--	--	na	6.3E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.7E-02	na	2.5E+02	--	--	--	--	--	--	--	--	2.2E-01	5.7E-02	na	2.5E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.7E-02	na	2.5E+02	--	--	--	--	--	--	--	--	2.2E-01	5.7E-02	na	2.5E+02
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	2.5E+02	--	--	--	--	--	--	--	--	--	--	na	2.5E+02
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.8E-02	3.7E-02	na	8.6E-01	--	--	--	--	--	--	--	--	8.8E-02	3.7E-02	na	8.6E-01
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	8.6E-01	--	--	--	--	--	--	--	--	--	--	na	8.6E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	3.1E+04	--	--	--	--	--	--	--	--	--	--	na	3.1E+04
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.9E+02	--	--	--	--	--	--	--	--	--	--	na	3.9E+02
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.5E+04	--	--	--	--	--	--	--	--	--	--	na	1.5E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	5.3E-01	3.9E-03	na	2.5E-03	--	--	--	--	--	--	--	--	5.3E-01	3.9E-03	na	2.5E-03
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	5.3E-01	3.9E-03	na	1.3E-03	--	--	--	--	--	--	--	--	5.3E-01	3.9E-03	na	1.3E-03
Hexachlorobenzene[C]	0	--	--	na	7.7E-03	--	--	na	9.0E-03	--	--	--	--	--	--	--	--	--	--	na	9.0E-03
Hexachlorobutadiene[C]	0	--	--	na	5.0E+02	--	--	na	5.9E+02	--	--	--	--	--	--	--	--	--	--	na	5.9E+02
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	1.3E-01	--	--	na	1.5E-01	--	--	--	--	--	--	--	--	--	--	na	1.5E-01
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	4.6E-01	--	--	na	5.4E-01	--	--	--	--	--	--	--	--	--	--	na	5.4E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	9.7E-01	--	na	7.4E-01	--	--	--	--	--	--	--	--	9.7E-01	--	na	7.4E-01
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
Hexachloroethane[C]	0	--	--	na	8.9E+01	--	--	na	1.0E+02	--	--	--	--	--	--	--	--	--	--	na	1.0E+02
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	5.7E-01	--	--	--	--	--	--	--	--	--	--	na	5.7E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[C]	0	--	--	na	2.6E+04	--	--	na	3.0E+04	--	--	--	--	--	--	--	--	--	--	na	3.0E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	4.5E+01	5.2E+00	na	--	4.6E+01	5.3E+00	na	--	--	--	--	--	--	--	--	--	4.6E+01	5.3E+00	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.9E-01	na	5.4E-02	--	--	--	--	--	--	--	--	1.4E+00	7.9E-01	na	5.4E-02
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.2E+03	--	--	--	--	--	--	--	--	--	--	na	4.2E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.1E-02	na	--	--	--	--	--	--	--	--	--	--	3.1E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.2E+04	--	--	--	--	--	--	--	--	--	--	na	2.2E+04
Nickel	0	9.6E+01	1.1E+01	na	4.6E+03	9.8E+01	1.1E+01	na	4.9E+03	--	--	--	--	--	--	--	--	9.8E+01	1.1E+01	na	4.9E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+03
N-Nitrosodimethylamine[C]	0	--	--	na	8.1E+01	--	--	na	9.5E+01	--	--	--	--	--	--	--	--	--	--	na	9.5E+01
N-Nitrosodiphenylamine[C]	0	--	--	na	1.6E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	na	1.9E+02
N-Nitrosodi-n-propylamine[C]	0	--	--	na	1.4E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Parathion	0	6.5E-02	1.3E-02	na	--	6.6E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.6E-02	1.3E-02	na	--
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB Total[C]	0	--	--	na	1.7E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	--	--	na	2.0E-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	6.4E+00	4.9E+00	na	8.2E+01	6.5E+00	5.0E+00	na	9.6E+01	--	--	--	--	--	--	--	--	**6.5E+00**	**5.0E+00**	**na**	**9.6E+01**
Phenol	0	--	--	na	4.6E+06	--	--	na	4.9E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E+06**
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+04**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+01**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.2E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.2E+00**
Strontium-90	0	--	--	na	8.0E+00	--	--	na	8.5E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.5E+00**
Tritium	0	--	--	na	2.0E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+04**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+01	5.1E+00	na	1.2E+04	--	--	--	--	--	--	--	--	**2.0E+01**	**5.1E+00**	**na**	**1.2E+04**
Silver	0	9.4E-01	--	na	--	9.6E-01	--	na	--	--	--	--	--	--	--	--	--	**9.6E-01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	1.1E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+02**
Tetrachloroethylene[C]	0	--	--	na	8.9E+01	--	--	na	1.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.0E+02**
Thallium	0	--	--	na	6.3E+00	--	--	na	6.7E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.7E+00**
Toluene	0	--	--	na	2.0E+05	--	--	na	2.1E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+05**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	7.4E-01	2.0E-04	na	8.8E-03	--	--	--	--	--	--	--	--	**7.4E-01**	**2.0E-04**	**na**	**8.8E-03**
Tributyltin	0	4.6E-01	6.3E-02	na	--	4.7E-01	6.4E-02	na	--	--	--	--	--	--	--	--	--	**4.7E-01**	**6.4E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	1.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.0E+03**
1,1,2-Trichloroethane[C]	0	--	--	na	4.2E+02	--	--	na	4.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E+02**
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	9.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.5E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	7.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	6.1E+01	--	--	na	7.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.1E+01**
Zinc	0	6.2E+01	6.2E+01	na	6.9E+04	6.3E+01	6.4E+01	na	7.3E+04	--	--	--	--	--	--	--	--	**6.3E+01**	**6.4E+01**	**na**	**7.3E+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	4.6E+03
Arsenic	9.2E+01
Barium	na
Cadmium	3.8E-01
Chromium III	2.4E+01
Chromium VI	6.5E+00
Copper	2.7E+00
Iron	na
Lead	3.2E+00
Manganese	na
Mercury	5.4E-02
Nickel	6.5E+00
Selenium	3.1E+00
Silver	3.8E-01
Zinc	2.5E+01

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

ATTACHMENT A

Substantially Identical Storm Water Outfalls – Grindall Creek

The following analysis of the drainage areas for each of the Grindall Creek outfalls has been performed for the purpose of grouping them into sets of substantially identical outfalls. This analysis is based upon the criteria set forth in the USEPA's NPDES Storm Water Sampling Guidance Document, EPA 833-B-92-001.

Industrial Activities and Processes

The primary industrial activities, which are performed in a manner that are exposed to storm water, in all of the drainage areas for the Spruance Plant's outfalls to Grindall Creek are material transportation by truck and railcar, other vehicular traffic, including parking, and limited amounts of bulk and containerized (i.e., 55 gallon drums and dry boxes) material storage). The following is a detailed discussion of the industrial activities performed in each drainage area, including those performed under roof.

Outfall 003

The primary activities within the 003 drainage area are the storage and movement of trucks and railcars containing materials both in bulk and sealed containers. This drainage area includes the location of the facility's primary railcar holding area. There are no manufacturing, material recovery, or bulk material storage operations performed within this drainage area.

Outfall 004

A portion of the drainage area for 004 is used for the transportation of materials both in bulk and containers. Bulk storage tanks and unloading areas for toluene and tetrahydrofuran are also present but are contained within a dike and concrete curb, respectively. Other containerized storage is also present under roof. Vapor recovery carbon adsorption units formerly located within this drainage area now lie within an area contained with storm water routed to the site wastewater treatment facility.

Outfall 005

The drainage area for 005 includes a portion of the buildings used for the processing of Mylar® film products and for the manufacture and processing of Kevlar® polymer and fibers. However, all of these activities are performed under roof. This drainage area is also used for the transportation of materials both in bulk and containers. Additionally, there is a major Virginia Power substation that contains a significant number of large oil-filled transformers located within this drainage area.

Outfall 006

The only significant industrial activity within this drainage area is the transportation of materials both in bulk and containers.

Outfall 007

This drainage area includes a small portion of the roof of a building formerly used in the production and processing of Nylon. The only other significant industrial activity within this drainage area is the transportation of materials both in bulk and containers.

Outfall 008

This drainage area includes the on-site Virginia Power building and another major substation area. This drainage area also includes a small portion of the road used for the transportation of materials both in bulk and containers.

Outfall 002

This drainage area includes a portion of the building used for the production of Nomex®. However, all of those activities are performed under roof. The unloading of lime from railcars also takes place in this area. The unloading area is under roof with localized containment and diversion of storm water to the wastewater treatment system. There are also several electrical transformers within the drainage area which do not have secondary containment. Additionally, this area is also used for the transportation of other materials both in bulk and containers.

Outfall 009

Most of the industrial activities in the 009 drainage area are in the sub-drainage area for the outfall sump. (Please refer to the discussion of the outfall sump in the Storm Water Management Practices section below). The industrial activities within this drainage area include the bulk storage of relatively small quantities of liquids which are within secondary containment; the storage of bulk liquids in tanks within concrete dikes; drainage from the roof of the North Warehouse, a Tyvek® research building, and a portion of the roof of the Tyvek® manufacturing building; a hazardous waste drum storage pad; a sulfuric acid tanker truck unload station; and two sulfuric acid storage tanks. The hazardous waste storage pad is under roof and curbed, and the sulfuric acid unloading area and storage tanks are diked to effectively isolate them from contact with storm water discharges. Also within this drainage area is the transportation of materials both in bulk and containers.

The only industrial activity outside of the outfall sump sub-drainage area is the drainage from a small portion of the plant's railroad siding used for the transportation of material both in bulk and containers.

For drainage areas 002 through 008 all of the industrial activities other than materials transportation are relatively minor and should have no substantial impact upon the storm water characteristics of the outfalls. Therefore outfalls 002 through 008 have substantially identical activities in terms of their impact upon storm water discharges.

Significant Materials that may be Exposed to Storm Water

All significant materials are stored and handled in some manner to effectively isolate them from contact with storm water.

Storm Water and Material Management Practices

Except for secondary containment as previously noted, all of the outfalls to Grindall Creek except 003 and 009 have no significant auxiliary storm water management systems. The drainage from industrial areas within the 003 drainage area flows overland through a dense vegetative area prior to discharging.

The drainage for most of the industrial activities in the drainage areas for Outfall 009 is collected in the outfall sump. The water collected in the outfall sump is normally diverted to the plant's wastewater treatment facilities. The water from the outfall sump is mixed with other wastes which are monitored by a continuous Total Organic Carbon Analyzer in the Nomex® operating area. That area is responsible to monitor and respond as appropriate to abnormal TOC.

The storm water diversion pump in the outfall sump is capable of pumping 200 gallons per minute (gpm). Additionally, the sump is able to store approximately 428,000 gallons of storm water. Therefore the outfall sump is able to handle approximately 716,000 gallons of storm water in a 24-hour period. This equates to approximately 1.8 inches of rainfall.

The significant material management practices for each outfall to Grindall Creek are discussed in the Industrial Activities and Processes section above.

Flows

Outfalls 002 through 008 have substantially identical hydrology based upon the criteria of the size of the drainage area and the percent of impervious area. The size of these drainage areas ranges from 1.4 to 6.3 acres with a mean acreage of 4.2 acres. All of these drainage areas are within 76% of the mean drainage area and all of those drainage areas, excluding the smallest, are within 50% of the mean. All of these areas are primarily impervious with small amounts of landscaping area.

Outfall 003 is larger in size, 16.0 acres, and less than 25% of the drainage area consists of impervious surfaces. Therefore the storm water discharges from this drainage area have significantly different flow characteristics.

The drainage area to Outfall 009 is unique in that most of the drainage, for storms within the range of those used for discharge monitoring, is diverted from the outfall sump to the Spruance Plant's wastewater treatment facilities. The only portion of the drainage area for Outfall 009 that is associated with industrial activity and which is not diverted to the process sewer is a small portion of the Plant's railroad siding. Most of this residual area consists of vegetation and the CSX railroad right-of-way.

Discharge Monitoring Data

None of the plant's outfalls to Grindall Creek demonstrated any significant difference in the results of the discharge monitoring conducted for the last VPDES permit application (9/29/92) except as noted below.

In regards to biological parameters, Outfall 002 had somewhat higher Ammonia, TKN, BOD and COD values in the 1992 application data. However, at the time the outfalls were analyzed there was a large amount of decaying leaves and sticks located in a depression through which the storm water had to flow prior to the monitoring point. Subsequent analyses have shown no significant levels of these organic indicators or Fecal Coliforms. DMR monitoring since 1994 has shown consistency over time (Table 1 attached) except for a slight decrease in pH concurrent with the containment and treatment of potentially lime conveying storm water starting in 1996.

In regards to metals, Outfalls 005 and 002 in the 1992 application data had discharge concentrations that were somewhat higher for Zinc than the mean for all of the Grindall Creek outfalls. Also, the concentrations were significantly higher than the mean for Lead at Outfall 005 and for Copper at Outfall 002.

Summary

Based upon the above analysis, if VPDES application monitoring is required for the Spruance Plant's outfalls to Grindall Creek, all of the outfalls should be considered substantially identical except Outfalls 003 and 009. However, the drainage area of Outfall 009 that has activities associated with industrial activity is well contained with the majority of flow sent to treatment via the outfall sump.

Therefore, such application monitoring along Grindall Creek should be limited to no more than Outfalls 002 and 003. Should additional discharge monitoring be required, it would be appropriate to request that Outfall 009 be excluded based upon the presence of the outfall sump as discussed above.

TABLE 1
STORMWATER SAMPLING RESULTS
OUTFALL 002

Storm Event	1/30/95	6/6/95	12/18/95	7/8/96	12/13/96	7/2/97	1/8/98
Amount (in.)	0.34	0.15	0.5	1.05	0.9	0.15	0.6
Amount (gal.)	60,526	26,703	89.000	187,000	160,700	26,714	106,900
pH	6.94	8.05	6.72	5.0	6.0	5.8	5.45
TSS (mg/l)	7.0	39.5	12.9	58.0	17.0	52.0	67.0
COD (mg/l)	30.4	217	140	38.4	24.1	96.9	70.0
NH3 (mg/l)	0.64	1.27	0.82	0.41	0.43	0.84	0.37
TKN (mg/l)	3.1	15.0	15.2	2.57	0.80	2.11	4.5
N/N (mg/l)	0.85	0.63	0.02	0.90	0.50	1.96	1.78
Dis Cr (ug/l)	0.9	1.4	0.8	<1.0	<15	<5.0	<5.0
Pb (ug/l)	<5.0	5.0	<5.0	<5.0	<5.0	<11	8.0
Cu (ug/l)	8.0	12	6.0	12.5	<20.0	<22	6.0
Ni (ug/l)	<5.0	<5.0	<80	<40	<5.0	<5.0	<5.0
Zn (ug/l)	590	90	380	470	167	260	180
O/G (mg/l)	2.0	1.14	1.10	2.7	<1.0	2.0	<1.0

Attachment M

Toxicity Evaluations

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

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

SUBJECT: Whole Effluent Toxicity (WET) Test Data Review:
du Pont Spruance, VPDES Permit No. VA0004669

TO: Curtis J. Linderman, Water Permits Manager, PRO

FROM: Emilee Carpenter, PRO

DATE: July 10, 2008

COPIES: Deborah DeBiasi, CO - WET

Facility Name: E I du Pont de Nemours and Company – Spruance Plant
Permit Number: VA0004669
Receiving Stream James River (Lower) - Freshwater tidal
Facility SIC: 2821: Plastics Materials, Synthetic Fibers, and Nonvulcanizable Elastomers
2824: Manmade Organic Fibers
In-stream Waste Concentration (IWC): Outfall 001: IWC $_{acute}$ 25%, IWC $_{chronic}$ 14.3%
Effluent Design Flow 25.4 MGD

Stream Flows	**Low Flows**	**High Flows**
1-Day, 10-Year	445 MGD	1068 MGD
7-Day, 10-Year	500 MGD	1263 MGD

FACILITY DESCRIPTION

The permit for this industrial discharger is in the process of reissuance. E.I. du Pont de Nemours and Company Incorporated operates a manufacturing plant located in Chesterfield County, Virginia. This facility, referred to as the Spruance Plant, manufactures synthetic resins, fiber, and sheet products. The facility has many outfalls; however, DEQ staff has determined that the Toxics Management Program is only applicable to Outfall 001. The effluent from Outfall 001 is discharged to a drainage ditch on company property which flows into the tidal James River. The maximum 30-day average flow is 43.67 MGD but all evaluations are based on 60 MGD because of a modeling study performed by du Pont. In July 1998 Wu-Send Lung Ph.D. completed the final report of his results of a modeling study designed to quantify the mixing zone of the effluent in the James River, Mixing Zone Modeling of du Pont Spruance Plant Discharge. This report provides dilution ratios (based on effluent flow of 60.0 MGD) of 4:1 for acute exposure and 7:1 for chronic exposure to be used for determination of compliance with the Criterion Maximum Concentration (CMC) and the Criterion Continuous Concentration (CCC). These dilution values have been used in the WETLIM10.xls spreadsheet which is used to determine acceptable endpoints for test results. The CMC for this permit is 1.02 TU_a, equivalent to an LC_{50} of 98% effluent. The CCC for this permit is 10.00 TU_c, equivalent to an NOEC of 10%.

FACILITY REQUIREMENTS

The expiring VPDES permit contains a WET Testing Program for outfall 001; requirements of the WET tests are based on Guidance Memorandum Number 00-2012.

The expiring permit was reissued effective January 23, 2002 and included a Whole Effluent Toxicity Program special condition requiring annual monitoring for outfall 001. Required testing included acute and chronic tests using *Ceriodaphnia dubia* and *Pimephales promelas*; both testing scenarios required 24-hour flow-proportioned effluent samples. All toxicity tests were performed by Olver Laboratories. No quality control problems were found in any of the tests performed for the VPDES permit.

The acute tests were required to be 48-hour static tests using *C. dubia* and *P. promelas.* The chronic tests were the chronic 3_Brood Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia* and the Chronic 7-Day Static Renewal Survival and Growth Test using *Pimephales promelas.*

Results of the whole effluent toxicity tests performed on samples since the permit reissuance in 2002 indicate compliance with the WET Program in the current permit. During the permit term, all of the acute tests resulted in LC_{50}s ≥ 99%. Additionally, all the chronic tests also passed the permitting requirements of an NOEC ≥ 11%.

Attached is the WETLim10 spreadsheet, which was used to compute the endpoints for acute and chronic toxicity contained in the special condition. At the bottom of page three is a recommended dilution series for the chronic tests which, if used will simplify the determination of compliance with the chronic toxicity endpoint contained in the permit.

DATA SUMMARY

Table 1: Results of **Acute Toxicity Tests** *C. dubia.*

TEST DATE	TEST RESULT	% SURVIVAL IN 100% EFFLUENT	TEST LAB	COMMENTS
June 2002	LC50 > 100%	100%	Olver Laboratories, Inc.	1, 2
June 2003	LC50 > 100%	100%	Olver Laboratories, Inc.	3, 4
June 2004	LC50 > 100%	100%	Olver Laboratories, Inc.	-
June 2005	LC50 > 100%	100%	Olver Laboratories, Inc.	-
June 2005	LC50 > 100%	100%	Olver Laboratories, Inc.	8
June 2007	LC50 > 100%	100%	Olver Laboratories, Inc.	-
June 2008	LC50 > 100%	100%	Olver Laboratories, Inc.	-

Table 2: Results of **Acute Toxicity Tests** *P. promelas* .

TEST DATE	TEST RESULT	% SURVIVAL IN 100% EFFLUENT	TEST LAB	COMMENTS
June 2002	LC50 > 100%	100%	Olver Laboratories, Inc.	-
June 2003	LC50 > 100%	90%	Olver Laboratories, Inc.	3, 4
June 2004	LC50 > 100%	100%	Olver Laboratories, Inc.	-
June 2005	LC50 > 100%	100%	Olver Laboratories, Inc.	-
June 2005	LC50 > 100%	100%	Olver Laboratories, Inc.	8
June 2007	LC50 > 100%	100%	Olver Laboratories, Inc.	-
June 2008	LC50 > 100%	100%	Olver Laboratories, Inc.	-

Table 3: Results of **Chronic Toxicity Tests** *C. dubia* .

TEST DATE	TEST RESULT	% SURVIVAL IN 100% EFFLUENT	TEST LAB	COMMENTS
June 2002	NOEC= 100%	100%	Olver Laboratories, Inc.	5
June 2003	NOEC= 57.6%	100%	Olver Laboratories, Inc.	3, 4, 5
June 2004	NOEC=57.6%	90%	Olver Laboratories, Inc.	-
June 2005	NOEC= 100%	100%	Olver Laboratories, Inc.	-
June 2006	NOEC= 57.6%	100%	Olver Laboratories, Inc.	8
June 2007	NOEC= 57.6%	100%	Olver Laboratories, Inc.	-
June 2008	NOEC= 100%	100%	Olver Laboratories, Inc.	-

Table 4: Results of **Chronic Toxicity Tests** *P. promelas.*

TEST DATE	TEST RESULT	% SURVIVAL IN 100% EFFLUENT	TEST LAB	COMMENTS
June 2002	NOEC= 100%	100%	Olver Laboratories, Inc.	5, 6
June 2003	NOEC= 100%	90%	Olver Laboratories, Inc.	3, 4, 5, 6
June 2004	NOEC= 100%	100%	Olver Laboratories, Inc.	6, 7
June 2005	NOEC= 57.6%	88%	Olver Laboratories, Inc.	6
June 2006	NOEC= 100%	100%	Olver Laboratories, Inc.	-
June 2007	NOEC= 100%	92.5%	Olver Laboratories, Inc.	-
June 2008	NOEC= 100%	97.5%	Olver Laboratories, Inc.	-

Comments:

1. DO was not measured daily in one replicate at each concentration (only at 0 and 48 hours).
2. pH was not measured daily in one replicate at each concentration (only at 0 and 48 hours).
3. The alkalinity of the dilution water was outside of the suggested range of 57 –64 mg/L as $CaCO_3$.
4. The pH of the dilution water was outside of the suggested range of 7.4 –7.8, or 7.9- 8.3 for mineral water.
5. PMSD was not provided; this reporting was not required until July 2003.
6. *P. promelas* were fed 1.0mL *Artemia nauplii* rather than the now required 0.15 mL. The feeding regimen was in compliance with the standards at the time of testing.
7. Test repeated because initial test exceeded the upper percent MSD
8. Alkalinity and hardness were not measured in 100% effluent at the beginning of the test.

CONCLUSIONS & RECOMMENDATIONS

The results of these toxicity tests for outfall 001are summarized in Tables 1 through 4, above. As indicated, all tests met the appropriate toxicity criterion (LC50>99% or NOEC> IWC). Thus, these annual compliance toxicity tests indicate that effluent from outfall 001 has not demonstrated acute toxicity in undiluted effluent or chronic toxicity at instream exposures.

The permitting staff recommend continuing the annual whole effluent toxicity testing during the upcoming permit cycle. Draft WET Special Condition language follows.

Whole Effluent Toxicity (WET) Monitoring Program

1. Biological Monitoring

   a. In accordance with the schedule in Part I.C.10.b below, the permittee shall conduct annual acute and chronic toxicity tests for the duration of the permit. The permittee shall collect 24-hour flow-proportioned composite samples of final effluent from outfall 001.
   The acute tests to use are:

   48 Hour Static Acute test using *Ceriodaphnia dubia*
   48 Hour Static Acute test using *Pimephales promelas*

   These acute tests shall be performed with a minimum of 5 dilutions, derived geometrically, for calculation of a valid LC_{50}. Express the results as TU_a (Acute Toxicity Units) by dividing 100 by the calculated LC_{50} ($100/LC_{50}$) for DMR reporting.

   The chronic tests to use are:

   Chronic 3-Brood Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia*
   Chronic 7-Day Static Renewal Survival and Growth Test using *Pimephales promelas*

   These chronic tests shall be conducted in such a manner and at sufficient dilutions (minimum of five dilutions, derived geometrically) to determine the "No Observed Effect Concentration" (NOEC) for survival and reproduction or growth. Results which cannot be determined (i.e., a "less than" NOEC value) are not acceptable, and a retest will have to be performed. Express the test NOEC as TU_c (Chronic Toxic Units), by dividing 100/NOEC for DMR reporting. Report the LC_{50} at 48 hours and the IC_{25} with the NOECs in the test report.

   The permittee may provide additional samples to address data variability; these data shall be reported and may be included in the evaluation of effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3

   b. The test dilutions should be able to determine compliance with the following endpoints

      (1) Acute LC50 of **98%** equivalent to a TU_a of **1.02**.
      (2) Chronic NOEC of **10%** equivalent to a TU_c of **10.00**.

   c. The test data will be evaluated for reasonable potential at the conclusion of the permit term. The data may be evaluated sooner if requested by the permittee, or if toxicity has been noted. Should evaluation of the data indicate that a limit is needed, a WET limit and compliance schedule will be required and the toxicity tests in Part I.C.10.a may be discontinued.

2. Reporting Schedule

   The permittee shall submit reports with the DMR and supply 2 copies of the toxicity test report for the tests specified in accordance with the following schedule:

Period	Compliance Date	Submittal Date
Annual 1	By 12/31/2008	By 01/10/2009
Annual 2	By 12/31/2009	By 01/10/2010
Annual 3	By 12/31/2010	By 01/10/2011
Annual 4	By 12/31/2011	By 01/10/2012
Annual 5	By 12/31/2012	By 01/10/2013

C. dubia

Facility = du Pont-Spruance
Chemical = Toxicity of *Ceriodaphnia dubia*
Chronic averaging period = 4
WLAa = 12
WLAc = 7
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 6
Expected Value = 1.49074
Variance = .800030
C.V. = 0.6
97th percentile daily values = 3.62759
97th percentile 4 day average = 2.48027
97th percentile 30 day average= 1.79791
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
1
1.736111
1.736111
1
1.736111
1.736111

P. promelas

Facility = Toxicity of Fathead Minnow (*P. promelas*)
Chemical = du Pont- Spruance
Chronic averaging period = 4
WLAa = 12
WLAc = 7
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:
observations = 6
Expected Value = 1.12268
Variance = .453751
C.V. = 0.6
97th percentile daily values = 2.73196
97th percentile 4 day average = 1.86791
97th percentile 30 day average= 1.35401
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:
1
1
1
1.736111
1
1

Note: All acute data were omitted from the analysis because censored data is not used in a limitation analysis if the uncensored data establishes no need for a limit, per the Allan Brockenbrough Memo (1/29/03). All chronic data was converted to Toxicity Units using the WETLIM 10 spreadsheet.

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Acute Endpoint/Permit Limit			**Use as LC_{50} in Special Condition, as TUa on DMR**				
ACUTE	**1.023802279**	**TUa**	**LC_{50} =**	**98**	% Use as	**1.02**	**TUa**
ACUTE WLAa		**1.2**	Note: Inform the permittee that if the mean of the data exceeds				
			this TUa:	**1.0**	a limit may result using WLA.EXE		

Chronic Endpoint/Permit Limit			**Use as NOEC in Special Condition, as TUc on DMR**				
CHRONIC	**10.23802279**	**TU_c**	**NOEC =**	**10**	% Use as	**10.00**	**TU_c**
BOTH*	**12.00000029**	**TU_c**	**NOEC =**	**9**	% Use as	**11.11**	**TU_c**
AML	**10.23802279**	**TU_c**	**NOEC =**	**10**	% Use as	**10.00**	**TU_c**

ACUTE WLAa,c	**12**	Note: Inform the permittee that if the mean		
CHRONIC WLAc	**7**	of the data exceeds this TUc:		**4.2072609**
* Both means acute expressed as chronic		a limit may result using WLA.EXE		

Enter data in the cells with blue type:

Entry Date:	07/16/08	
Facility Name:	duPont-Spruance Plant	
VPDES Number:	**VA0004669**	
Outfall Number:	**1**	
Plant Flow:	**60**	MGD
Acute 1Q10:	**240**	MGD
Chronic 7Q10:	**420**	MGD

% Flow to be used from MIX.EXE	
100	%
100	%

Difuser /modeling study?		
Enter Y/N	**Y**	
Acute	4	:1
Chronic	7	:1

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

IWC_a	25	%	Plant flow/plant flow + 1Q10
IWC_c	14.28571429	%	Plant flow/plant flow + 7Q10

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

Dilution, acute	4	100/IWCa
Dilution, chronic	7	100/IWCc
WLA_a	1.2	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	7	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	12	ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variatior	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447	Default = 0.41
eB	0.6010373	Default = 0.60
eC	2.4334175	Default = 2.43
eD	2.4334175	Default = 2.43 (1 samp)

No. of sample 1

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

$LTA_{a,c}$	4.9313364	WLAa,c X's eA						
LTA_c	4.2072611	WLAc X's eB				Rounded NOEC's		%
MDL** with $LTA_{a,c}$	12.00000029	TU_c	NOEC =	8.333333	(Protects from acute/chronic toxicity)	NOEC =	9	%
MDL** with LTA_c	10.23802279	TU_c	NOEC =	9.767511	(Protects from chronic toxicity)	NOEC =	10	%
AML with lowest LTA	10.23802279	TU_c	NOEC =	9.767511	Lowest LTA X's eD	NOEC =	10	

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

						Rounded LC50's		%
MDL with $LTA_{a,c}$	1.200000029	TU_a	LC50 =	83.333331	%	LC50 =	84	%
MDL with LTA_c	1.023802279	TU_a	LC50 =	97.675110	%	LC50 =	98	

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

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

	Vertebrate		Invertebrate	
	IC_{25} Data or LC_{50} Data	LN of data	IC_{25} Data or LC_{50} Data	LN of data
	**********		**********	
1	0		0	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA	NEED DATA
Mean	0	0	Mean	0	0
Variance	0	0.000000	Variance	0	0.000000
CV	0		CV	0	

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929666

eA = 0.410944686

Using the log variance to develop eB

(P. 100, step 2b of TSD)

δ_4^2 = 0.086177696

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC

(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD

(P. 100, step 4b of TSD)

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

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

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

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

Table 1. ACR using Vertebrate data

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

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

Table 2. ACR using Invertebrate data

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

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

Table 3. **ACR used: 10**

	Enter LC_{50}	TUc	Enter NOEC	TUc
1	>100	#DIV/0!	100	1.000000
2	>100	#DIV/0!	57.6	1.736111
3	>100	#DIV/0!	57.6	1.736111
4	>100	#DIV/0!	100	1.000000
5	>100	#DIV/0!	57.6	1.736111
6	>100	#DIV/0!	57.6	1.736111
7	>100	#DIV/0!	100	1.000000
8	>100	#DIV/0!	100	1.000000
9	>100	#DIV/0!	100	1.000000
10	>100	#DIV/0!	57.6	1.736111
11	>100	#DIV/0!	100	1.000000
12	>100	#DIV/0!	100	1.000000
13	>100	#DIV/0!	100	1.000000
14	>100	#DIV/0!	100	1.000000
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

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

NO DATA	$\%LC_{50}$
NO DATA	TUa

DILUTION SERIES TO RECOMMEND

Table 4.	Monitoring % Effluent	Monitoring TUc	Limit % Effluent	Limit TUc
Dilution series based on data mean	23.8	4.2072609		
Dilution series to use for limit			10	10
Dilution factor to recommend:	0.4875288		0.3162278	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	48.8	2.05	31.6	3.16
	23.8	4.21	10.0	10.00
	11.6	8.63	3.2	31.62
	5.65	17.70	1.0	100.00
Extra dilutions if needed	2.75	36.31	0.3	316.23
	1.34	74.47	0.1	1000.00

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

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

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

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

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

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

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

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

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

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

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

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

Attachment N

RCRA Permit

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

In reply, refer to: 3WC23

September 21, 1998

DELIVERED BY
FEDERAL EXPRESS

Mr. Robert L. Dunn
Virginia Environmental Affairs Manager
DuPont Spruance Plant
5401 Jefferson Davis Highway
Richmond, Va. 23234

Re: Final Permit
DuPont Spruance Plant
VAD009305137.

Dear Mr. Dunn

Enclosed is the Final Permit for the DuPont Spruance facility. Please note on page 2 of the Final Permit, that the effective date of the permit is October 22, 1998. Also, enclosed is EPA's letter of August 25,1998, which further clarifies the agency's position regarding the permit. Both documents will become part of the administrative record.

If you have any questions regarding the Final permit, please call Michael Jacobi at 215-814-3435.

Sincerely,

Maria Parisi Vickers
Associate Division Director
Office of RCRA
Chemicals & Waste Management Division

enc: Final Permit
EPA Ltr. Permit Appeal

cc: Mohammad R. Habibi, VDEQ-Piedmont Office
Steven E. Frazier, VDEQ
Leslie Romanchik, VDEQ
George Beadles, Jr.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PERMIT
FOR CORRECTIVE ACTION AND WASTE MINIMIZATION;
PURSUANT TO THE RESOURCE CONSERVATION AND RECOVERY ACT
AS AMENDED BY THE HAZARDOUS AND SOLID WASTE
AMENDMENTS OF 1984

Permittee: E. I. du Pont de Nemours and Company

Permit Number: VAD009305137

Facility: 5401 Jefferson Davis Highway
Richmond, Virginia 23234

This permit is issued by the United States Environmental Protection Agency (EPA) under the authority of the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. § 6901 et seq., and EPA regulations at 40 C.F.R. Parts 260-271 and Part 124, to E. I. du Pont de Nemours and Company(hereinafter the Permittee) to meet the requirements of HSWA at the Permittee's facility in Richmond, Virginia at latitude 37° 27' 06" North and longitude 72° 26' 00" West (the Facility).

The complete RCRA permit for purposes of Section 3005(c) of RCRA, 42 U.S.C. § 6925(c) consists of two portions: this permit, issued by EPA, which addresses the provisions of HSWA, and the permit issued by the Virginia Department of Environmental Quality (VDEQ) on March 28, 1996, which addresses the provisions of the Code of Virginia Regulations, Chapter 14, Article 4, Title 10.1, for which the State has received authorization under Section 3006(b) of RCRA, 42 U.S.C. § 6926(b), to administer and enforce in lieu of the federal hazardous waste management program under RCRA. As of the date of issuance of this permit, the State has not received authorization to administer the provisions of HSWA. This permit, which addresses provisions of HSWA, will be enforced by EPA. The VDEQ permit will be enforced by VDEQ - but EPA may also exercise its enforcement authority if and when appropriate.

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions contained herein (Parts I and II and Attachments A through H) and the applicable regulations contained in 40 C.F.R. Parts 124, 260 through 264, 268 and 270 as specified in the permit or which are, by statute, self-implementing. (40 C.F.R. § 270.32(c))

This permit is based on information provided to EPA by the Permittee. Section 3005(c)(3) of RCRA provides authority to review and amend the permit at any time. Any inaccuracies found in the information submitted by the Permittee may be grounds for the termination, modification or revocation and reissuance of this permit (see 40 C.F.R. §§ 270.41, 270.42 and 270.43). The

Permittee must inform EPA of any deviation from or changes in the submitted information which would affect the Permittee's ability to comply with the applicable statutes, regulations or permit conditions.

This permit is effective on October 22, 1998, and shall remain in effect until October 22, 2008, unless revoked and reissued, modified or terminated in accordance with 40 C.F.R. §§ 270.41, 270.42, 270.43 or continued in accordance with 40 C.F.R. § 270.51(a).

Attachment O

Reduced Monitoring Evaluation

All <QL data were treated as equal to the QL for this evaluation.

The reduced monitoring analysis for the parameters with limitations follows.

	Outfall 001 TP	
	Mo Avg kg/d	Mo Avg/Limit Ratio
10-Jun-06	15.2	0.035266821
10-Jul-06	23	0.053364269
10-Aug-06	24	0.055684455
10-Sep-06	23	0.053364269
10-Oct-06	18	0.041763341
10-Nov-06	13	0.030162413
10-Dec-06	7	0.016241299
10-Jan-07	8	0.018561485
10-Feb-07	8	0.018561485
10-Mar-07	8	0.018561485
10-Apr-07	8	0.018561485
10-May-07	9	0.020881671
10-Jun-07	9	0.020881671
10-Jul-07	9	0.020881671
10-Aug-07	15	0.034802784
10-Sep-07	25	0.05800464
10-Oct-07	22	0.051044084
10-Nov-07	25	0.05800464
10-Dec-07	<22	0.051044084
10-Jan-08	<17	0.039443155
10-Feb-08	10	0.023201856
10-Mar-08	7	0.016241299
10-Apr-08	11	0.025522042
10-May-08	13	0.030162413
10-Jun-08	<15	0.034802784
Average Ratio		0.033800464
Baseline Monitoring Frequency		1/Day
Current Monitoring Frequency		1/ Week
Proposed Monitoring Frequency		1/ Week

Outfall 001: The only parameter eligible for reduced monitoring at Outfall 001 is Total Phosphorus (TP). The other parameters monitored have either new, more stringent limitations or monitoring (TRC, DO and PFOA) or effluent data close to the permit limits (pH and temperature). $cBOD_5$ and ammonia have no limitations at this outfall so numeric evaluations are not possible; reduced monitoring based on BEJ was carried forward from the previous permit for these two parameters.

Outfall 101: Monitoring for PFOA is new with the reissuance so reduced monitoring is not appropriate at this time. HMPA has no limitation at this outfall so a numeric evaluation is not possible; reduced monitoring based on BEJ was carried forward from the previous permit. All other parameters were evaluated for reduced monitoring.

$cBOD_5$ and TSS qualify for a reduced monitoring frequency of 4/week; however, as this facility is an E4 facility, 3/week monitoring will be continued.

Ammonia qualify for a reduced monitoring frequency of 3/week.

Nickel and zinc qualify for a reduced monitoring frequency of 1/ 6 months; however, given the need for the stormwater management plan as a result of the elevated nickel and zinc levels, staff believe continued monitoring at 1/quarter to be appropriate.

All OCPSF chemicals were reported as <QL for the specified" monitoring period, with the exception of Bis (2-ethylhexyl) phthalate which reported one value above the QL (1/25 samples). Therefore, permitting staff feel continued reduced monitoring for all OCPSF chemicals is appropriate. However, additional reduced monitoring is not available as the monitoring frequency is already at the minimum frequency of once per year.

Outfall 103: All parameters with limitations at this outfall were evaluated for reduced monitoring and are being discharged at levels well below the established permit limitations. Per the permit manual, these parameters qualify for a reduced monitoring frequency of 1/ quarter. However, given the complexity of the groundwater treatment process and the ongoing groundwater monitoring and corrective action plan, staff believe continued monitoring at 1/ Month to be appropriate.

$cBOD_5$ and zinc have no limitations at this outfall so numeric evaluations are not possible; reduced monitoring based on BEJ was carried forward from the previous permit for these two parameters.

Fact Sheet
DuPont - Spruance

	Outfall 101									
	$cBOD_5$		TSS		NH_3		Ni		Zn	
	Mo Avg kg/d	Mo Avg/Limit Ratio	Mo Avg kg/d	Mo Avg/Limit Ratio	Mo Avg kg/d	Mo Avg/Limit Ratio	Mo Avg kg/d	Mo Avg/Limit Ratio	Mo Avg kg/d	Mo Avg/Limit Ratio
10-Jun-06	127	0.437931034	660	0.6	129.2	0.483895131	0.57	0.001322506	0.19	0.000440835
10-Jul-06	138	0.475862069	590	0.536363636	92	0.269005848				
10-Aug-06	167	0.575862069	512	0.465454545	70	0.204678363				
10-Sep-06	171.87	0.592655172	810	0.736363636	126.5	0.369883041	0.57	0.001322506	0.19	0.000440835
10-Oct-06	135.1	0.465862069	739	0.671818182	88	0.329588015				
10-Nov-06	134	0.462068966	654	0.594545455	94	0.352059925				
10-Dec-06	188.12	0.648689655	578	0.525454545	131.2	0.383625731	0.4	0.000928074	<0.2	0.000464037
10-Jan-07	141	0.486206897	592	0.538181818	123	0.460674157				
10-Feb-07	142	0.489655172	573	0.520909091	96	0.280701754				
10-Mar-07	200	0.689655172	678	0.616363636	170	0.63670412				
10-Apr-07	209	0.720689655	744	0.676363636	136	0.397660819	1.2	0.002784223	0.6	0.001392111
10-May-07	192	0.662068966	570	0.518181818	132	0.385964912	0.2	0.000464037	<0.2	0.000464037
10-Jun-07	140	0.482758621	465	0.422727273	98	0.286549708	0.2	0.000464037	<0.2	0.000464037
10-Jul-07	144.31	0.49762069	491	0.446363636	86.7	0.253508772				
10-Aug-07	149	0.513793103	405	0.368181818	105	0.307017544				
10-Sep-07	194.27	0.669896552	586	0.532727273	149.6	0.560299625				
10-Oct-07	167.51	0.57762069	733	0.666363636	155	0.453216374				
10-Nov-07	138	0.475862069	557	0.506363636	161	0.470760234				
10-Dec-07	123.97	0.427482759	404	0.367272727	122.1	0.357017544	0.4	0.051044084	<0.4	0.051044084
10-Jan-08	134	0.462068966	470	0.427272727	116	0.339181287		0.039443155		0.039443155
10-Feb-08	145	0.5	400	0.363636364	119	0.445692884				
10-Mar-08	153	0.527586207	514	0.467272727	154	0.450292398				
10-Apr-08	207	0.713793103	689	0.626363636	144	0.539325843	0.9	0.002088167	<0.4	0.000928074
10-May-08	<0.1	0.000344828	528	0.48	146.3	0.547940075				
10-Jun-08	129	0.444827586	471	0.428181818	93	0.348314607	0.5	0.034802784	0.2	0.034802784
Average Ratio		0.520034483		0.524109091		0.396542348		0.013466357		0.012988399
Baseline Monitoring Frequency		1/Day		1/Day		1/Day		1/Month		1/Month
Current Monitoring Frequency		3 Days/Week		3 Days/Week		3 Days/Week		1/Quarter		1/Quarter
Proposed Monitoring Frequency		3 Days/Week		3 Days/Week		3 Days/Week		1/Quarter		1/Quarter

Fact Sheet
DuPont - Spruance

	Outfall 103							
	Chlorofom		Trichlorofluoromethane		Carbon Disulfide		HMPA	
	Mo Avg kg/d	Mo Avg/Limit Ratio	Mo Avg kg/d	Mo Avg/Limit Ratio	Mo Avg kg/d	Mo Avg/Limit Ratio	Mo Avg kg/d	Mo Avg/Limit Ratio
10-Jun-06	<0.0011	0.011340206	<0.0011	0.011340206	<0.0011	0.000611111	0.01372	0.0519697
10-Jul-06	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00005	0.0001894
10-Aug-06	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00004	0.0001515
10-Sep-06	0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00005	0.0001894
10-Oct-06	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00006	0.0002273
10-Nov-06	<0.001	0.010309278	0.002	0.020618557	<0.001	0.000555556	0.00008	0.000303
10-Dec-06	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	0.00116	0.0043939
10-Jan-07	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00006	0.0002273
10-Feb-07	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	0.00916	0.034697
10-Mar-07	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00003	0.0001136
10-Apr-07	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00005	0.0001894
10-May-07	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	0.10296	0.39
10-Jun-07	<0.001	0.010309278	0.001	0.010309278	<0.001	0.000555556	<0.00005	0.0001894
10-Jul-07	0.002	0.020618557	<0.001	0.010309278	<0.001	0.000555556	<0.00005	0.0001894
10-Aug-07	0.002	0.020618557	<.001	0.010309278	<.001	0.000555556	<.00006	0.0002273
10-Sep-07	0.002	0.020618557	<0.001	0.010309278	<0.001	0.000555556	0.00021	0.0007955
10-Oct-07	0.002	0.020618557	<0.001	0.010309278	<0.001	0.000555556	<0.00005	0.0001894
10-Nov-07	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	0.00006	0.0002273
10-Dec-07	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<.00007	0.0002652
10-Jan-08	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<.00007	0.0002652
10-Feb-08	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	0.00013	0.0004924
10-Mar-08	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00006	0.0002273
10-Apr-08	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00007	0.0002652
10-May-08	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	0.00011	0.0004167
10-Jun-08	<0.001	0.010309278	<0.001	0.010309278	<0.001	0.000555556	<0.00007	0.0002652
Average Ratio		0.012		0.010762887		0.000557778		0.0194667
Baseline Monitoring Frequency		2/Month		2/Month		2/Month		2/Month
Current Monitoring Frequency		1/Month		1/Month		1/Month		1/Month
Proposed Monitoring Frequency		1/Month		1/Month		1/Month		1/Month

Attachment P

NPDES Industrial Rating Worksheet

NPDES PERMIT RATING WORK SHEET

NPDES NO. VA0004669

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

Facility Name: DuPont - Spruance Plant

City: Chesterfield County

Receiving Water: James River

Reach Number: _____

Is this facility a steam electric power plant (SIC=4911) with one or more of the following characteristics?
1. Power output 500 MW or greater (not using a cooling pond/lake)
2. A nuclear power plant
3. Cooling water discharge greater than 25% of the receiving stream's 7Q10 flow rate

☐ YES; score is 600 (stop here) ☒ NO (continue)

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

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

FACTOR 1: Toxic Pollutant Potential

PCS SIC Code: _____ Primary SIC Code: 2821 Other SIC Codes: 2824, 2819
Industrial Subcategory Code: 016 (Code 000 if no subcategory)

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

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

Code Number Checked: 9

Total Points Factor 1: 45

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

Section A ☐ Wastewater Flow Only Considered

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

Section B ☐ Wastewater and Stream Flow Considered

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

Code Checked from Section A or B: 52

Total Points Factor 2: 20

FACTOR 3: Conventional Pollutants
(only when limited by the permit)

NPDES NO: LA0004669

A. Oxygen Demanding Pollutant: (check one) ☐ BOD ☐ COD ☒ Other: cBOD5

Permit Limits: (check one)		Code	Points
☐	< 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: 2

Points Scored: 5

B. Total Suspended Solids (TSS)

Permit Limits: (check one)		Code	Points
☐	< 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: 3

Points Scored: 15

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

Permit Limits: (check one)	*Nitrogen Equivalent*	*Code*	*Points*
☐	< 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: 2

Points Scored: 5

Total Points Factor 3: 25

FACTOR 4: Public Health Impact

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

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

☐ NO (If no, go to Factor 5)

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

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

Code Number Checked: 8

Total Points Factor 4: 20

NPDES NO.
VA0004646

SCORE SUMMARY

Factor	Description	Total Points
1	Toxic Pollutant Potential	45
2	Flows/Streamflow Volume	20
3	Conventional Pollutants	25
4	Public Health Impacts	20
5	Water Quality Factors	10
6	Proximity to Near Coastal Waters	19
	TOTAL (Factors 1 through 6)	139

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? n/a

☐ No

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

Reason:

NEW SCORE: _____

OLD SCORE: _____

Virginia Kelley
Permit Reviewer's Name

(804) 527-5048
Phone Number

8 July 2008
Date

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

PIEDMONT REGIONAL OFFICE

L. Preston Bryant, Jr.
Secretary of Natural Resources

4949-A Cox Road, Glen Allen, Virginia 23060
(804) 527-5020 Fax (804) 527-5106
www.deq.virginia.gov

David K. Paylor
Director

Gerard Seeley, Jr.
Regional Director

OCT 0 3 2008

William J. Harvey
E. I. du Pont de Nemours & Co. (Inc.)
Spruance Plant
5401 Jefferson Davis Highway
Richmond, VA 23234

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Re: Reissuance of VPDES Permit Number VA0004669, DuPont Spruance

Dear Mr. Harvey:

Your VPDES permit is enclosed. A Discharge Monitoring Report (DMR) form is included with the permit. Please make additional copies of the DMR for future use. The first DMR for the month of October is due by November 10, 2008. If you still have DMR data to report as required by the previous permit please submit it as an attachment to the first DMR required by this permit. Monitoring results on the DMRs should be reported to the same number of significant digits as are included in the permit limit for the parameter. Please send DMRs to:

Virginia DEQ, Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

Note that DEQ has launched an e-DMR program that allows you to submit the effluent data electronically. If you are interested in participating in this program please visit the following website for details: http://www.deq.virginia.gov/water/edmrfaq.html

As provided by Rule 2A:2 of the Supreme Court of Virginia, you have thirty days from the date of service (the date you actually received this decision or the date it was mailed to you, whichever occurred first) within which to appeal this decision by filing a notice of appeal in accordance with the Rules of the Supreme Court of Virginia with the Director, Virginia Department of Environmental Quality. In the event that this decision is served on you by mail, three days are added to that period.

Alternatively, any owner under §§ 62.1-44.16, 62.1-44.17 and 62.1-44.19 of the State Water Control Law aggrieved by any action of the State Water Control Board taken without a formal hearing, or by inaction of the Board, may demand in writing a formal hearing of such owner's grievance, provided a petition requesting a hearing is filed with the Board. Said petition must meet requirements set forth in 9 VAC 25-230-130 B, the Board's Procedural Rule No. 1. In cases involving actions of the Board, the petition must be filed within thirty days after notice of this action is mailed to an owner by certified mail.

If you have any questions about the permit, please call Gina Kelly at (804) 527-5048.

Sincerely,

Curtis J. Linderman, P.E.
Water Permit Manager

Enclosures: Permit
cc: L. Waverly Smith, DuPont
EPA-3WP12
DEQ-OWPP
DEQ-PRO-OECA

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY

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

SUBJECT: Reissuance of VPDES Permit No. VA0004669 for E. I. du Pont de Nemours & Co. (Inc.)— Spruance Plant, Chesterfield County

TO: Curtis J. Linderman, P.E., Water Permit Manager

FROM: Virginia R. E. Kelly, Environmental Specialist II

DATE: September 29, 2008

COPIES: PRO, OWPS, EPA

Legal Name of Owner: E. I. du Pont de Nemours & Co. (Inc.)

Application Submitted By: William J. Harvey, Vice President and General Manager-AFS/DPP

Application Date: The reissuance application was received on July 28, 2006; additional information was submitted on November 27, 2006, December 22, 2006, January 9, 2007, January 25, 2007, and September 26, 2007. The date of complete application was September 26, 2007.

Type of Discharge: Existing Industrial Wastewater Discharge

Wastewater Treatment Facilities: The facility utilizes various treatment operations based on the waste stream being treated. See Fact Sheet item 10.

Receiving Stream:

	Outfall 001	Outfalls 002 through 009
Name:	James River	Grindall Creek
Basin:	James River (Lower)	James River (Lower)
Subbasin:	N/A	N/A
Section:	1	1a
Class:	II	III
Special Standards:	bb	None
River Mile:	2-JMS103.77	Storm water outfalls 002 through 009 enter Grindall Creek, which enters Falling Creek at river mile 0.22. Falling Creek enters the James River at river mile 2-JMS103.15.

Public Notice: The application and draft permit were given public notice according to the Permit Regulation. No comments were received.

Planning: The discharge is in conformance with all existing planning documents for the area.

EPA Comments: In an email dated August 26, 2008, EPA has no objections to the reissuance of this permit.

VDH Comments: No comments.

Previous Board Action: Consent Special Orders were executed with DuPont – Spruance in August 1976, October 1980, and October 1994, all of which have been satisfied and cancelled. The 1976 Order addressed pH violations. The 1980 Order extended the term of the permit until it could be reissued. The 1994 Order established an implementation schedule for achieving compliance with the effluent limitations on the discharges from DuPont's water treatment plant.

A Consent Special Order was also executed addressing issues of ground water contamination at the site. An Order was initially executed in January 1987 and amended in November 1987. The Order was revised and reissued in July 1990. As EPA issued the facility a RCRA permit, which also deals with ground water contamination issues, the revised July 1990 Order was closed in 2002.

Staff Comments: This permit expired on January 23, 2007. The permit reissuance did not occur prior to its expiration due to significant challenges regarding the east ditch discharge.

The facility has paid all required maintenance fees.

The staff believes that the attached effluent limits will maintain the Water Quality Standards adopted by the Board.

Basis for Effluent Limits: The proposed effluent limitations are based on Best Engineering Judgment, Water Quality-based Effluent Limitations, Richmond Crater Water Quality Management Plan, applicable Federal effluent Guidelines, and WQS.

Licensed Operator Requirements: A Class I licensed operator is required.

Staff Recommendations: The staff recommends that:

1. The attached effluent limits and monitoring requirements be approved.

2. VPDES Permit No. VA0004669 be issued.

APPROVED: _____
Water Permit Manager

DATE: 9/30/08

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: DuPont Spruance

NPDES Permit Number: VA0004669

Permit Writer Name: Virginia Kelly

Date: 18 July 08

Major [X] **Minor** [ ] **Industrial** [X] **Municipal** [ ]

I.A. Draft Permit Package Submittal Includes:	Yes	No	N/A
1. Permit Application?	✓		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	✓		
3. Copy of Public Notice?		X	
4. Complete Fact Sheet?	✓		
5. A Priority Pollutant Screening to determine parameters of concern?	✓		
6. A Reasonable Potential analysis showing calculated WQBELs?	✓		
7. Dissolved Oxygen calculations?		✓	
8. Whole Effluent Toxicity Test summary and analysis?	✓		
9. Permit Rating Sheet for new or modified industrial facilities?	✓		

I.B. Permit/Facility Characteristics	Yes	No	N/A
1. Is this a new, or currently unpermitted facility?		✓	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	✓		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	✓		

I.B. Permit/Facility Characteristics – cont.	Yes	No	N/A
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		✓	
5. Has there been any change in streamflow characteristics since the last permit was developed?		✓	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?	✓		
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	✓		
8. Does the facility discharge to a 303(d) listed water?	✓		
a. Has a TMDL been developed and approved by EPA for the impaired water?		✓	
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?	✓		
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?		✓	
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		✓	
10. Does the permit authorize discharges of storm water?	✓		
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?	✓		
12. Are there any production-based, technology-based effluent limits in the permit?	✓		
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		✓	
14. Are any WQBELs based on an interpretation of narrative criteria?		✓	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		✓	
16. Does the permit contain a compliance schedule for any limit or condition?		✓	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		✓	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	✓		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		✓	
20. Have previous permit, application, and fact sheet been examined?	✓		

pages 3-5 = N/A

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Review Checklist – For Non-Municipals

(To be completed and included in the record for all non-POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet **or** permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	✓		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	✓		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	✓		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?	✓		

II.C. Technology-Based Effluent Limits (Effluent Guidelines & BPJ)	Yes	No	N/A
1. Is the facility subject to a national effluent limitations guideline (ELG)?	✓		
a. If yes, does the record adequately document the categorization process, including an evaluation of whether the facility is a new source or an existing source?	✓		
b. If no, does the record indicate that a technology-based analysis based on Best Professional Judgement (BPJ) was used for all pollutants of concern discharged at treatable concentrations?			✓
2. For all limits developed based on BPJ, does the record indicate that the limits are consistent with the criteria established at 40 CFR 125.3(d)?	✓		
3. Does the fact sheet adequately document the calculations used to develop both ELG and /or BPJ technology-based effluent limits?	✓		
4. For all limits that are based on production or flow, does the record indicate that the calculations are based on a "reasonable measure of ACTUAL production" for the facility (not design)?	✓		
5. Does the permit contain "tiered" limits that reflect projected increases in production or flow?		✓	
a. If yes, does the permit require the facility to notify the permitting authority when alternate levels of production or flow are attained?			✓
6. Are technology-based permit limits expressed in appropriate units of measure (e.g., concentration, mass, SU)?	✓		

II.C. Technology-Based Effluent Limits (Effluent Guidelines & BPJ) – cont.	Yes	No	N/A
7. Are all technology-based limits expressed in terms of both maximum daily, weekly average, and/or monthly average limits?	✓		
8. Are any final limits less stringent than required by applicable effluent limitations guidelines or BPJ?		✓	

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	✓		
2. Does the record indicate that any WQBELs were derived from a completed and EPA approved TMDL?		✓	
3. Does the fact sheet provide effluent characteristics for each outfall?	✓		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	✓		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	✓		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	✓		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	✓		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations where data are available)?		✓	
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	✓		
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	✓		
6. For all final WQBELs, are BOTH long-term (e.g., average monthly) AND short-term (e.g., maximum daily, weekly average, instantaneous) effluent limits established?	✓		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	✓		
8. Does the fact sheet indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	✓		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters?	✓		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			✓
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	✓		
3. Does the permit require testing for Whole Effluent Toxicity in accordance with the State's standard practices?	✓		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit require development and implementation of a Best Management Practices (BMP) plan or site-specific BMPs?	✓		
a. If yes, does the permit adequately incorporate and require compliance with the BMPs?	✓		
2. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			✓
3. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	✓		

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	✓		
List of Standard Conditions – 40 CFR 122.41 Duty to comply Duty to reapply Need to halt or reduce activity not a defense Duty to mitigate Proper O & M Permit actions Property rights Duty to provide information Inspections and entry Monitoring and records Signatory requirement Bypass Upset Reporting Requirements Planned change Anticipated noncompliance Transfers Monitoring reports Compliance schedules 24-Hour reporting Other non-compliance			
2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for existing non-municipal dischargers regarding pollutant notification levels [40 CFR 122.42(a)]?	✓		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Virginia Kelly
Title	Environmental Specialist II
Signature	Virginia Kelly
Date	18 July 2008

FACTOR 5: Water Quality Factors NPDES NO. VA0004669

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):* 52 *Enter the multiplication factor that corresponds to the flow code:* 0.30

Check appropriate facility HPRI Code (from PCS):

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

Base Score: (HPRI Score) 30 X (Multiplication Factor) .3 = 9 (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
X Yes	1	10
☐ No	2	0

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

	Code	Points
☐ Yes	1	10
X No	2	0

Code Number Checked: A 1 B 1 C 2

Points Factor 6: A 9 + B 10 + C 0 = 19 TOTAL