National Pollutant Discharge Elimination System (NPDES) Permit Program

F A C T   S H E E T

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for **Kraton Polymers U.S., LLC**

Public Notice No.: 11-03-063
Public Notice Date: March 25, 2011
Comment Period Ends: April 24, 2011

OEPA Permit No.: **0IF00008**
Application No.: **OH0007030**

Name and Address of Applicant:

Kraton Polymers
P.O. Box 235
Belpre, Ohio 45714

Name and Address of Facility Where Discharge Occurs:

Kraton Polymers
Washington Boulevard
Belpre, Ohio 45714
Washington County

Receiving Water: **Davis Creek & Ohio River**

Subsequent Stream Network: **Ohio River**

Introduction

Development of a Fact Sheet for NPDES permits is mandated by Title 40 of the Code of Federal Regulations, Section 124.8 and 124.56. This document fulfills the requirements established in those regulations by providing the information necessary to inform the public of actions proposed by the Ohio Environmental Protection Agency, as well as the methods by which the public can participate in the process of finalizing those actions.

This Fact Sheet is prepared in order to document the technical basis and risk management decisions that are considered in the determination of water quality based NPDES Permit effluent limitations. The technical basis for the Fact Sheet may consist of evaluations of promulgated effluent guidelines, existing effluent quality, instream biological, chemical and physical conditions, and the relative risk of alternative effluent limitations. This Fact Sheet details the discretionary decision-making process empowered to the Director by the Clean Water Act and Ohio Water Pollution Control Law (ORC 6111). Decisions to award variances to Water Quality Standards or promulgated effluent guidelines for economic or technological reasons will also be justified in the Fact Sheet where necessary.

Effluent limits based on available treatment technologies are required by Section 301(b) of the Clean Water Act. Many of these have already been established by U.S. EPA in the effluent guideline regulations (a.k.a. categorical regulations) for industry categories in 40 CFR Parts 405-499. Technology-based regulations for publicly-owned treatment works are listed in the Secondary Treatment Regulations (40 CFR Part 133). If regulations have not been established for a category of dischargers, the director may establish technology-based limits based on best professional judgment (BPJ).

Ohio EPA reviews the need for water-quality-based limits on a pollutant-by-pollutant basis. Wasteload allocations are used to develop these limits based on the pollutants that have been detected in the discharge, and the receiving water's assimilative capacity. The assimilative capacity depends on the flow in the water receiving the discharge, and the concentration of the pollutant upstream. The greater the upstream flow, and the lower the upstream concentration, the greater the assimilative capacity is. Assimilative capacity may represent dilution (as in allocations for metals), or it may also incorporate the break-down of pollutants in the receiving water (as in allocations for oxygen-demanding materials).

The need for water-quality-based limits is determined by comparing the wasteload allocation for a pollutant to a measure of the effluent quality. The measure of effluent quality is called PEQ - Projected Effluent Quality. This is a statistical measure of the average and maximum effluent values for a pollutant. As with any statistical method, the more data that exists for a given pollutant, the more likely that PEQ will match the actual observed data. If there is a small data set for a given pollutant, the highest measured value is multiplied by a statistical factor to obtain a PEQ; for example if only one sample exists, the factor is 6.2, for two samples - 3.8, for three samples - 3.0. The factors continue to decline as samples sizes increase. These factors are intended to account for effluent variability, but if the pollutant concentrations are fairly constant, these factors may make PEQ appear larger than it would be shown to be if more sample results existed.

Summary of Permit Conditions

The requirements for **outfall 001** are almost identical to those in the current permit. Most of these are standard conditions for once-through cooling waters from power plants. The TSS limit is a 'net' limit; that is, it applies to the concentration of suspended solids only after subtracting the TSS concentration observed in the plant intake water. The pH limit is set at the standard technology-based level of 6.0 standard units (min.), rather than the WQS minimum of 6.5 S.U., because the dilution and alkalinity available in the Ohio River allows the WQS to be met.

Data submitted by the facility indicates that bis(2-ethylhexyl) phthalate concentrations measured at **outfalls 001** and **002** are likely to be contaminants from sampling equipment, rather than pollutants in the effluent. While composite samples intermittently show detectable concentrations of bis-2EHP, concurrent grab samples do not show detections of this compound. As a result of this data, monitoring and limits for bis-2EHP are not being required at outfalls 001 or 002.

Outfall 003 has limits that are based on both treatment-technology-based standards and Ohio WQS. Federal and State laws/regulation require that dischargers meet both treatment-technology-based limits and any more stringent standards needed to comply with state WQS. Permit limits are based on the more restrictive of the two. Treatment-technology-based limits for the Organic Chemicals, Plastics and Synthetic Fibers Industry, found in 40 CFR Part 414, contain concentration-based limits that are based on process type for conventional pollutants (BOD, TSS, pH), and treatment type for metals and individual organic pollutants.

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Procedures for Participation in the Formulation of Final Determinations

The draft action shall be issued as a final action unless the Director revises the draft after consideration of the record of a public meeting or written comments, or upon disapproval by the Administrator of the U.S. Environmental Protection Agency.

Within thirty days of the date of the Public Notice, any person may request or petition for a public meeting for presentation of evidence, statements or opinions. The purpose of the public meeting is to obtain additional evidence. Statements concerning the issues raised by the party requesting the meeting are invited. Evidence may be presented by the applicant, the state, and other parties, and following presentation of such evidence other interested persons may present testimony of facts or statements of opinion.

Requests for public meetings shall be in writing and shall state the action of the Director objected to, the questions to be considered, and the reasons the action is contested. Such requests should be addressed to:

Legal Records Section
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, Ohio 43216-1049

Interested persons are invited to submit written comments upon the discharge permit. Comments should be submitted in person or by mail no later than 30 days after the date of this Public Notice. Deliver or mail all comments to:

Ohio Environmental Protection Agency
Attention: Division of Surface Water
Permits and Compliance Section
P.O. Box 1049
Columbus, Ohio 43216-1049

The OEPA permit number and Public Notice numbers should appear on each page of any submitted comments. All comments received no later than 30 days after the date of the Public Notice will be considered.

Citizens may conduct file reviews regarding specific companies or sites. Appointments are necessary to conduct file reviews, because requests to review files have increased dramatically in recent years. The first 250 pages copied are free. For requests to copy more than 250 pages, there is a five-cent charge for each page copied. Payment is required by check or money order, made payable to Treasurer State of Ohio.

For additional information about this fact sheet or the draft permit, contact Daniel A. Kopec, (614) 644-1987, daniel.kopec@epa.state.oh.us.

Location of Discharge/Receiving Water Use Classification

Kraton Polymers discharges to Davis Creek at River Mile (RM) 0.08 (outfalls 001, 003, 013 and 014), 0.64 (outfall 002), 0.3 (outfalls 004 and 012), and 0.2 (outfalls 009, 010, 011, 018, and 019). Kraton Polymers also discharges to the Ohio River at Ohio River Mile Point 366 (outfalls 008, 015, 016, and 017). The approximate location of the facility is shown in Figure 1.

This segment of Davis Creek is described by Ohio EPA River Code: 17-027, USEPA River Reach #: 05030202-NA, County: Washington, Ecoregion: Western Allegheny Plateau. Davis Creek is presently designated for the following uses: Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS) and Primary Contact Recreation (PCR), Class B.

This segment of the Ohio River is described by Ohio EPA River Code: 25-500, USEPA River Reach #: 05030202-038, County: Washington, Ecoregion: Western Allegheny Plateau. The Ohio River is presently designated for the following uses: Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS) and Bathing Waters (BW).

Use designations define the goals and expectations of a waterbody. These goals are set for aquatic life protection, recreation use and water supply use, and are defined in the Ohio WQS (OAC 3745-1-07). The use designations for individual waterbodies are listed in rules -08 through -32 of the Ohio WQS. Once the goals are set, numeric water quality standards are developed to protect these uses. Different uses have different water quality criteria.

Use designations for aquatic life protection include habitats for coldwater fish and macroinvertebrates, warmwater aquatic life and waters with exceptional communities of warmwater organisms. These uses all meet the goals of the federal Clean Water Act. Ohio WQS also include aquatic life use designations for waterbodies which cannot meet the Clean Water Act goals because of human-caused conditions that cannot be remedied without causing fundamental changes to land use and widespread economic impact. The dredging and clearing of some small streams to support agricultural or urban drainage is the most common of these conditions. These streams are given Modified Warmwater or Limited Resource Water designations.

Recreation uses are defined by the depth of the waterbody and the potential for wading or swimming. Uses are defined for bathing waters, swimming/canoeing (Primary Contact) and wading only (Secondary Contact - generally waters too shallow for swimming or canoeing).

Water supply uses are defined by the actual or potential use of the waterbody. Public Water Supply designations apply near existing water intakes so that waters are safe to drink with standard treatment. Most other waters are designated for agricultural and industrial water supply.

Facility Description

The Kraton Polymers Belpre Plant primarily manufactures synthetic rubber polymers using styrene and butadiene or isoprene. The plant also does custom compounding of purchased plastic resins by mixing and blending elastomers with fillers and other ingredients. The plant operates two coal-fired boilers and one gas-fired boiler to generate steam.

The process operations performed at this facility are classified by the Standard Industrial Classification (SIC) codes 2822, "Synthetic Rubber Specialty Polymers", and 3087 “Custom Compounding of Purchased Plastic". Discharges resulting from process operations are therefore subject to Federal Effluent Guideline Limitations, contained in Chapter 40 of the Code of Federal Regulations, Part 414, "Organic Chemicals, Plastics and Synthetic Fibers" Industrial Category.

Description of Existing Discharge

Outfalls 001 and 003 discharge to Davis Creek at a point where it is a backwater of the Ohio River.

Outfall 001 is the main non-contact cooling water outfall from this plant. The discharge also contains non-process stormwater and small amounts of utility-related wastewater. This outfall is treated in a sedimentation pond prior to discharge.

Outfall 003 contains treated process water from the polymerization process units, along with storm water from process areas and coal pile runoff. The discharge is treated by flocculation, flotation, chemical precipitation, neutralization, activated sludge process, nitrification/de-nitrification, and pressure filtration.

Outfall 002 contains fly ash wastewater and boiler slag waters from steam generation at the site. These wastewaters are treated by sedimentation and pH adjustment.

Outfall 004 is stormwater runoff from non-process areas of the facility. This outfall has an in-plant sampling point for the coal pile runoff, outfall 602. This in-plant outfall is necessary to monitor the effectiveness of the coal pile treatment before mixing with other waters. Outfall 602 is treated by sedimentation and p H neutralization. Other outfall 004 flows are not treated.

Outfall 016 contains non-contact cooling water for the backup river water pump system. When this system is active, the flow from this system is approximately 11 gallons per minute. The discharge from outfall 016 is an intermittent discharge of non-contact cooling water for the back-up river water pump.

Outfalls 008 and 015 contain storm water from parking areas and areas surrounding the administrative office building at the site. Outfalls 009, 010, 011 and 012 are stormwater outfalls from the treatment plant area Outfalls 013 and 014 contain stormwater from the solids handling and management areas. None of these outfalls are treated prior to discharge.

New Outfalls 018 and 019 are storm water outfalls that share the same drainage area of the plant as outfalls 009, 010, 011, and 012. The drainage area for these new outfalls receive storm water runoff from a small section of the plant’s Effluent Treatment Facility, and a grassy, tree-covered area along the road leading to the fire-fighting training area.

New Outfall 017 was developed as part of the SPCC improvement projects to minimize or capture leaks associated with oil filled equipment at the river water pump house (RWPH).

Table 1 presents Effluent Characterization Using Ohio EPA bioassay data and Form 2C Data

Table 2 presents a summary of unaltered Discharge Monitoring Report (DMR) data for outfall 0IF00008 (001,002,003,004). Data are presented for the period February 2005 through December 2010, and current permit limits are provided for comparison.

Table 3 present monthly average PEQ_{avg} and daily maximum PEQ_{max} values of the monthly reported values to Ohio EPA for outfalls 001, 002 and 003.

Assessment of Impact on Receiving Waters

There is no recent biological data to assess this discharge. The Ohio River Valley Water Sanitation Commission (ORSANCO) described this segment of the river to be in partial attainment of the aquatic life and public water supply uses in their 2010 Biennial Assessment of Water Quality Conditions [305(b) Report]. Recreational uses are impaired in parts of this river segment. Fish consumption is considered to be impaired for the entire length of the Ohio River. Further information on river conditions can be found on ORSANCO's web site at: http://www.orsanco.org/rivinfo/305b.asp

Development of Water-Quality-Based Effluent Limits

Determining appropriate effluent concentrations is a multiple-step process in which parameters are identified as likely to be discharged by a facility, evaluated with respect to Ohio water quality criteria, and examined to determine the likelihood that the existing effluent could violate the calculated limits.

Parameter Selection Effluent data for the Kraton Polymers were used to determine what parameters should undergo wasteload allocation. The parameters discharged are identified by the data available to Ohio EPA - Discharge Monitoring Report (DMR) data submitted by the permittee, compliance sampling data collected by Ohio EPA, and any other data submitted by the permittee, such as priority pollutant scans required by the NPDES application or by pretreatment, or other special conditions in the NPDES permit. The sources of effluent data used in this evaluation are as follows:

Self-monitoring data (DMR)	February 2005 through December 2010
NPDES Form 2C data	June 2010
OEPA compliance sampling data	2009

The PEQ values are used according to Ohio rules to compare to applicable water quality standards (WQS) and allowable wasteload allocation (WLA) values for each pollutant evaluated. Initially, PEQ values are compared to the applicable average and maximum WQS. If both PEQ values are less than 25 percent of the applicable WQS, the pollutant does not have the reasonable potential to cause or contribute to exceedance of WQS, and no wasteload allocation is done for that parameter. If either PEQ_{avg} or PEQ_{max} is greater than 25 percent of the applicable WQS, a wasteload allocation is conducted to determine whether the parameter exhibits reasonable potential and needs to have a limit or if monitoring is required. See Tables 7(a-c) Parameter Assessment for a summary of the screening results.

Wasteload Allocation For those parameters that require a WLA, the results are based on the uses assigned to the receiving waterbody in OAC 3745-1. Dischargers are allocated pollutant loadings/concentrations based on the Ohio Water Quality Standards (OAC 3745-1). Most pollutants are allocated by a mass-balance method because they do not degrade in the receiving water. Wasteload allocations using this method are done using the following general equation: Discharger WLA = (downstream flow x WQS) - (upstream flow x background concentration). Discharger WLAs are divided by the discharge flow so that the allocations are expressed as concentrations.

Outfall 002 was allocated to protect the uses of Davis Creek, and was not allocated interactively with outfalls 001 and 003. Outfalls 001 and 003 discharge near the mouth of Davis Creek in an area that is considered backwaters of the Ohio River. As a result, these dischargers are allocated as Ohio River dischargers. Outfalls 001 and 003 were allocated interactively, with outfall 003 loads being considered part of the background loading for the 001 allocation.

The applicable waterbody uses for this facility's discharge and the associated stream design flows are as follows:

Aquatic life (WWH)		
Toxics (metals, organics, etc.)	Average	Annual 7Q10
	Maximum	Annual 1Q10
Agricultural Water Supply		Harmonic mean flow
Human Health (nondrinking)		Harmonic mean flow

Allocations are developed using a percentage of stream design flow as specified in Table 5, and allocations cannot exceed the Inside Mixing Zone Maximum criteria.

The data used in the wasteload allocation are listed in Tables 1 and 2. The wasteload allocation results to maintain all the applicable criteria are presented in Tables 4 and 5.

Whole Effluent Toxicity WLA Whole effluent toxicity (WET) is the total toxic effect of an effluent on aquatic life measured directly with a toxicity test. Acute WET measures short term effects of the effluent while chronic WET measures longer term and potentially more subtle effects of the effluent.

Water quality standards for WET are expressed in Ohio's narrative "free from" WQS rule [OAC 3745-1-04(D)]. These "free froms" are translated into toxicity units (TUs) by the associated WQS Implementation Rule (OAC 3745-2-09). Wasteload allocations can then be calculated using TUs as if they were water quality criteria.

The wasteload allocation calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit (TU_c) and 7Q10 flow for the average and the acute toxicity unit (TU_a) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. For Kraton Polymers, the wasteload allocation values are 1.2 TU_a and 32.13 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the IC_{25}:

$$TU_c = 100/IC_{25}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations except when the following equation is more restrictive (Ceriodaphnia dubia only):

$$TU_c = 100/\text{geometric mean of NOEC and LOEC}$$

The acute toxicity unit (TU_a) is defined as 100 divided by the LC_{50} for the most sensitive test species:

$$TU_a = 100/LC_{50}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations.

<u>Reasonable Potential/ Effluent Limits/Hazard Management Decisions</u>

After appropriate effluent limits are calculated, the reasonable potential of the discharger to violate the water quality standards must be determined. Each parameter is examined and placed in a defined "group". Parameters that do not have a water quality standard or do not require a wasteload allocation based on the initial screening are assigned to either group 1 or 2. For the allocated parameters, the preliminary effluent limits (PEL) based on the most restrictive average and maximum wasteload allocations are selected from Table 3. The average PEL (PEL_{avg}) is compared to the average PEQ (PEQ_{avg}) from Table 3, and the PEL_{max} is compared to the PEQ_{max}. Based on the calculated percentage of the allocated value [($PEQ_{avg} \div PEL_{avg}$) X 100, or ($PEQ_{max} \div PEL_{max}$) X 100)], the parameters are assigned to group 3, 4, or 5. The groupings are listed in Tables 7(a-c).

Outfall 001

The requirements for this outfall are almost identical to those in the current permit. Most of these are standard conditions for once-through cooling waters from power plants.

The TSS limit is a 'net' limit; that is, it applies to the concentration of suspended solids only after subtracting the TSS concentration observed in the plant intake water.

The pH limit is set at the standard technology-based level of 6.0 standard units (min.), rather than the WQS minimum of 6.5 S.U., because the dilution and alkalinity available in the Ohio River allows the WQS to be met.

The Ohio EPA risk assessment (Table 7a) places Mercury (APO) and Oil & Grease in group 5. The placement of these parameters along with the data in Tables 1 and 2 indicate that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality. For these parameters PEQ is greater than 100 percent of the wasteload allocation. Pollutants that meet this requirement must have permit limits under OAC Rule 3745-33-07(A)(1).

The Ohio EPA risk assessment (Table 7a) places mercury in group 5 which recommends limits to protect water quality. Due to the small data set and using the discretion allowed the Director under OAC 3745-33-07(A)(5), we are proposing monitoring, rather than limits, for this pollutants.

Ohio EPA risk assessment (Table 7a) places copper into group 4. The placement of copper as well as the data in Tables 1 and 2 supports the position that copper does not have the reasonable potential to contribute to WQS exceedance, and limits are not necessary to protect water quality. Monitoring for Group 4 pollutants (where PEQ exceeds 50 percent of the WLA) is required by OAC Rule 3745-33-07(A)(2).

Ohio EPA risk assessment (Table 7a) places arsenic, chlorides, dissolved solids, mercury, lead, nitrate + nitrite, selenium, zinc, barium, antimony, Chlorodibromomethane, iron, nickel, Dichlorodibromomethane, and sulfates in group 3. The placement of these parameters as well as the data included in Tables 1 and 2 supports that these parameters do not have the reasonable potential to contribute to WQS exceedance, and limits are not necessary to protect water quality. Monitoring is proposed to document that these pollutants continue to remain at low levels.

Outfall 002

The Ohio EPA risk assessment (Table 7b) places chlorine and mercury in group 5. The placement of these parameters as well as the data in Tables 1 and 2 indicate that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality. For these parameters PEQ is greater than 100 percent of the wasteload allocation. Pollutants that meet this requirement must have permit limits under OAC Rule 3745-33-07(A)(1).

The Ohio EPA risk assessment (Table 7b) places mercury in group 5 which recommends limits to protect water quality. Due to the small data set and using the discretion allowed the Director under OAC 3745-33-07(A)(5), we are proposing monitoring, rather than limits, for this pollutants.

Ohio EPA risk assessment (Table 7b) places copper into group 4. The placement of copper as well as the data in Tables 1 and 2 supports the position that copper does not have the reasonable potential to contribute to WQS exceedance, and limits are not necessary to protect water quality. Monitoring for Group 4 pollutants (where PEQ exceeds 50 percent of the WLA) is required by OAC Rule 3745-33-07(A)(2).

Ohio EPA risk assessment (Table 7b) places arsenic, dissolved solids, mercury, lead, selenium, barium, iron, nickel, and oil & grease in group 3. The placement of these parameters as well as the data included in Tables 1 and 2 supports that these parameters do not have the reasonable potential to contribute to WQS exceedance, and limits are not necessary to protect water quality. Monitoring is proposed to document that these pollutants continue to remain at low levels.

Outfall 003

As stated by the facility from the current permit and for this proposed permit, bis(2-ethylhexyl) phthalate concentrations measured at outfalls 003 are likely to be contaminants from sampling equipment, rather than pollutants in the effluent. While composite samples intermittently show detectable concentrations of bis-2EHP, concurrent grab samples do not show detections of this compound. As a result of this data, monitoring for bis-2EHP is proposed to document that these pollutants continue to remain at low levels.

Limits are based on both treatment-technology-based standards and Ohio WQS. Federal and State laws/regulation require that dischargers meet both treatment-technology-based limits and any more stringent standards needed to comply with state WQS. Permit limits are based on the more restrictive of the two. Treatment-technology-based limits for the Organic Chemicals, Plastics and Synthetic Fibers Industry, found in 40 CFR Part 414, contain concentration-based limits that are based on process type for conventional pollutants (BOD, TSS, pH), and treatment type for metals and individual organic pollutants.

The effluent limits for BOD, TSS and pH are from Subpart D of 40 CFR 414, "Thermoplastic Resins". The concentrations listed in this rule are directly used as effluent limits. In addition, this rule requires the use of loading limits determined by multiplying the concentration standard by the effluent flow (0.79 MGD) and by the conversion factor of 3.785 to obtain loadings in kg/day.

The BAT limits for metals and organics are found in Subpart I of 40 CFR 414, "Dischargers that use end of-pipe biological treatment". Again, the concentrations are directly applied as limits, and loading limits are calculated by multiplying BAT concentrations by 0.79 and 3.785.

Limiting TRC (Total residual Chlorine) shall continue at this outfall because the PEQ values suggest they exceed applicable WQ based limit of 0.038 mg/l.

The Ohio EPA risk assessment (Table 7c) places chlorine and copper in group 5. The placement of these parameters along with the data in Tables 1 and 2 indicate that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality. For these parameters PEQ is greater than 100 percent of the wasteload allocation. Pollutants that meet this requirement must have permit limits under OAC Rule 3745-33-07(A)(1).

Ohio EPA risk assessment (Table 7c) places dissolved solids in group 4. The placement of this parameters along with the data in Tables 1 and 2 support that this parameter does not have the reasonable potential to contribute to WQS exceedance, and limits are not necessary to protect water quality. Monitoring for Group 4 pollutants (where PEQ exceeds 50 percent of the WLA) is required by OAC Rule 3745-33-07(A)(2).

Ohio EPA risk assessment (Table 7c) places selenium, bis (2-ethylhexyl) phthalate, sulfates, barium, chlorides, lead, nickel, nitrate + nitrite, and oil & grease in group 3. The placement of these parameters along with the data in Tables 1 and 2 supports that these parameters do not have the reasonable potential to contribute to WQS exceedance, and limits are not necessary to protect water quality. Monitoring is proposed to document that these pollutants continue to remain at low levels.

Carcinogens Chlorodibromomethane (1) and Dichlorodibromomethane (2) are known carcinogens, which require the evaluation of the additive effect of these pollutants. Ohio Administrative Code 3745-33-07(A)(8) states that the additivity equation below must be included in the permit and used to determine compliance unless certain conditions are met.

$$\frac{\text{MAC-1}}{517} + \frac{\text{MAC-2}}{706} <= 1.0$$

MAC = Monthly Average Concentration

One of the conditions in the rule referenced above states that a pollutant may be removed from the consideration of additivity if the preliminary effluent limit (PEL) for the pollutant is less than the quantification level for that pollutant. For the pollutant above, the average PELs is less than the respective quantification level, so this parameter can be removed from the additivity equation.

Whole Effluent Toxicity Reasonable Potential WET values are compared to a calculated allowable effluent toxicity "AET" value. This comparison along with an assessment of the instream community is two ways in which whole effluent toxicity is evaluated.

AET calculations are similar to aquatic life criteria wasteload allocation calculations. The Q7,10 and chronic toxicity unit (TUc) are used to calculated the average allowable AET and the Q1,10 and acute toxicity unit (TUa) are used to calculate the maximum allowable AET. For the Kraton Polymers WWTP, the chronic AET is 134 TUc and acute AET is 1.0 TUa.

The effluent toxicity data shows toxicity values greater than 1.0 TUa (*13.9*) at outfall 003; however, this discharge mixes with the much larger outfall 001 flow before it reaches Davis Creek. The available data for outfall 001 indicates that this once-through cooling water discharge is not acutely toxic. Outfall 001 can therefore be viewed as dilution for outfall 003. The dilution ratio between these outfalls (approximately 27:1) is large enough that the combined discharge would not be toxic. Based on the current small database, it appears that the outfall 001/003 discharge does not have the reasonable potential to contribute to exceed WQS. To verify this, the permit contains an annual monitoring requirement for acute toxicity at outfalls 001 and 003.

The effluent data for outfall 002 does not indicate a toxicity hazard, and monitoring is not being required at this time.

Other Requirements

Outfall Signage
Part II of the permit includes requirements for signs to be placed at each outfall to the Ohio River, providing information about the discharge. Signage at outfalls is required pursuant to Ohio Administrative Code 3745-33-08(A).

Section 316(b) Compliance

The cooling water intake structure operated by Kraton Polymers has been evaluated using available information. At this time, Ohio EPA has determined that the cooling water intake structure represents the best technology available to minimize adverse environmental impact in accordance with Section 316(b) of the federal Clean Water Act (33 U.S.C. section 1326).

The permit requires all of this information listed above to be submitted with the permittee's next NPDES permit renewal application unless federal rules are promulgated which require the submittal of the information at an earlier date.

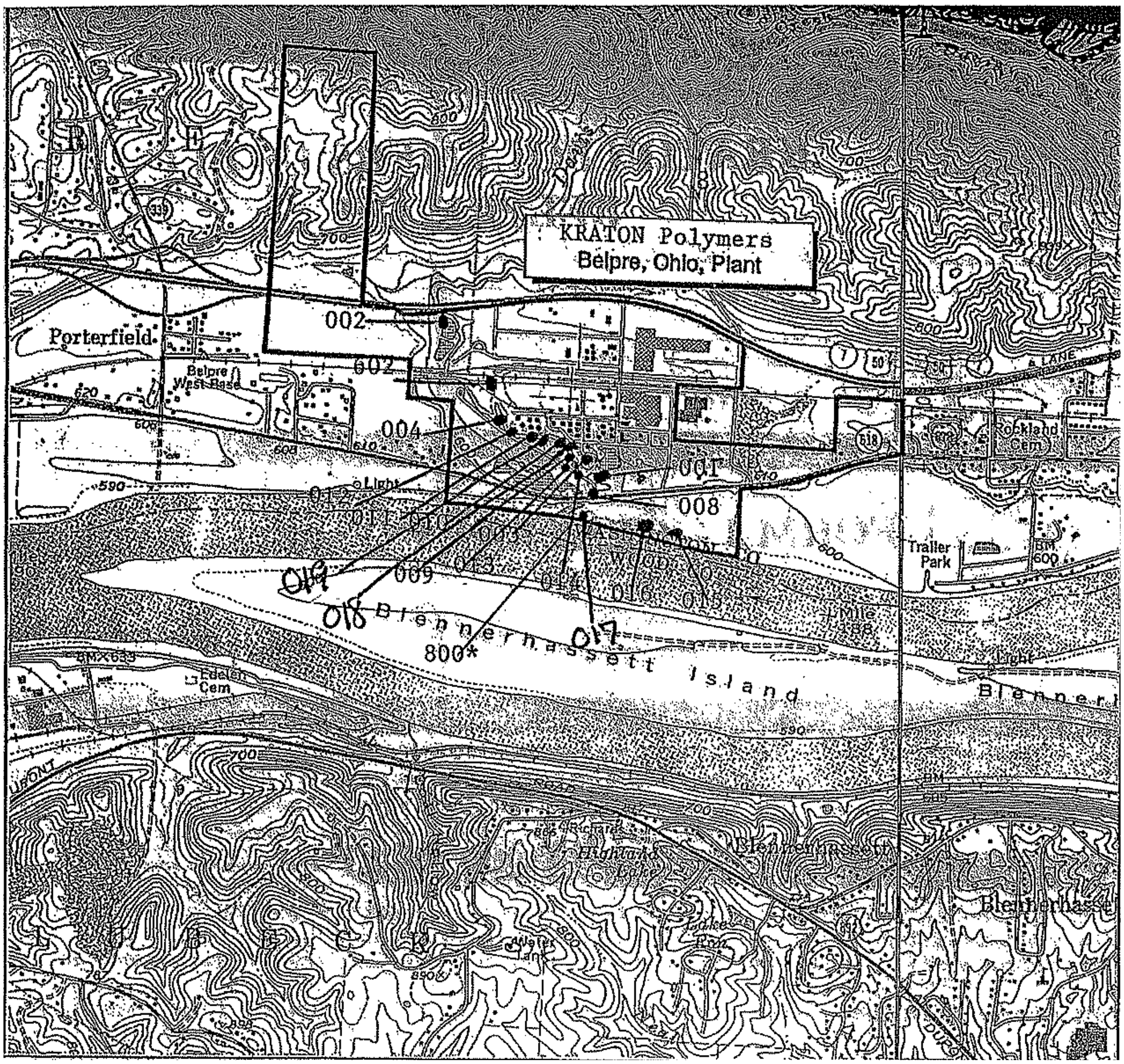

Figure 1. Approximate location of Kraton Polymers

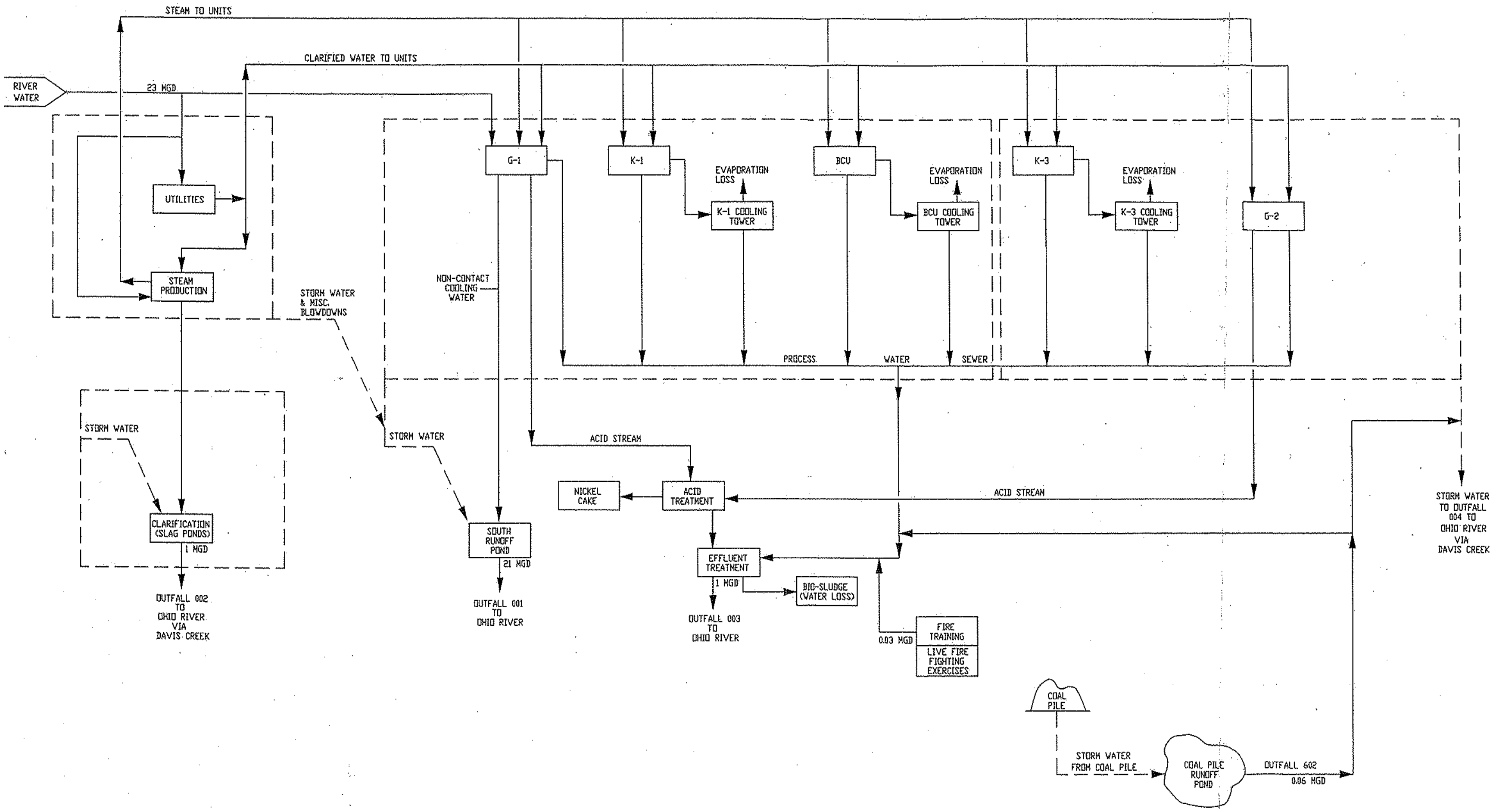

Figure 2. Diagram of Wastewater Treatment System

Table 1. Effluent Characterization Using Ohio EPA and Form 2C Data

Summary of analytical results for Kraton Polymers outfall 0IF00008. All values are in mg/l unless otherwise indicated. 2C = Data from application form 2C; OEPA = data from analyses by Ohio EPA; Decision Criteria: PEQ_{avg} = monthly averages; PEQ_{max} = daily maximum analytical results.

PARAMETER	**Form 2C**		**OEPA 3/2/09**	**DECISION CRITERIA**	
				PEQ_{avg}	**PEQ_{max}**
Outfall 001	***Max***	***Ave***			
Total Dissolved Solids	-	-	266	1203.9	1649.2
Total Suspended Solids	45	32.5	12	98.55	135
Arsenic (ug/L)	55.5	-	3.4	153.9	210.9
Total Organic Carbon	3.10	-	-	14.03	19.22
Copper (ug/L)	7.79	-	6.1	21.61	29.6
Nickel (ug/L)	5.71	-	4.1	15.83	21.7
Aluminum (ug/L)	852	-	681	2363.4	3237.6
Barium (ug/L)	52.2	-	48	144.8	198.4
Calcium	-	-	34	153.9	210.8
Hardness, Total	-	-	122	552.2	756.4
Iron (ug/L)	902	-	1080	2995.9	4104
Magnesium	10.5	-	9	29.13	39.9
Manganese (ug/L)	77	-	109	302.7	414.2
Potassium	-	-	2	9.05	12.4
Sodium	-	-	35	158.4	217
Strontium (ug/L)	-	-	175	792.05	1085
Zinc (ug/L)	-	-	10	45.26	62
Alkalinity	-	-	61.4	277.9	380.7
Ammonia	0.143	-	0.083	0.396	0.543
Chloride	-	-	54	244.4	334.8
Conductivity (umhos/cm)	-	-	435	1968.8	2697
Nitrate + Nitrite	1.51	-	1.32	4.18	5.74
TKN	0.234	-	0.28	0.77	1.064
Total Phosphorus	-	-	0.079	0.357	0.49
Chloroform (ug/L)	4.28	-	2.16	11.87	16.26
COD	98.4	28.3	-	272.9	373.9
Oil & Grease	38.5	5.5	-	106.8	146.3
Sulfate	85.7	-	-	387.9	531.3
Sulfite	0.64	-	-	2.89	3.96
Boron (ug/L)	0.103	-	-	0.28	0.39
Titanium	0.037	-	-	0.17	0.23
Antimony (ug/L)	1.76	-	-	7.96	10.9
Chromium (ug/L)	2.97	-	-	13.4	18.4
Lead (ug/L)	2.17	-	-	9.82	13.45
Mercury (ng/L)	11	6.2	-	30.5	41.8
Selenium (ug/L)	1.17	-	-	5.29	7.25
Chlorodibromomethane (ug/L)	0.436	-	-	1.97	2.7
Dichlorobromomethane (ug/L)	1.41	-	-	6.38	8.7

Outfall 002	*Form 2C*		OEPA 3/2/09	PEQ$_{avg}$	PEQ$_{max}$
	Max	*Ave*			
Biochemical Oxygen Demand	1.5	-	-	6.79	9.3
Chemical Oxygen Demand	17.2	-	-	77.85	106.6
Total Organic Carbon	1.84	-	-	8.33	11.41
Total Suspended Solids	60	26.5	-	166.4	228
Ammonia	0.14	-	-	0.63	0.87
Chlorine, T.R.	0.13	0.13	-	0.36	0.5
Nitrate + Nitrite	1.36	-	-	6.15	8.43
TKN	0.32	-	-	1.45	1.98
Oil & Grease	3.2	0.8	-	8.87	12.16
Sulfate	121	-	-	547.6	750.2
Sulfite	2.56	-	-	11.58	15.87
Aluminum (ug/L)	126	-	-	570.3	781.2
Barium (ug/L)	110	-	-	497.8	682
Boron (ug/L)	297	-	-	1344.2	1841.4
Iron, Total (ug/L)	223	-	-	1009.3	1382.6
Magnesium	13.8	-	-	62.46	85.56
Manganese	0.091	-	-	0.41	0.56
Antimony (ug/L)	1.3	-	-	5.88	8.06
Arsenic (ug/L)	219	96.2	-	607.5	832.2
Chromium, Total (ug/L)	5.02	-	-	22.72	31.1
Copper (ug/L)	74.9	74.9	-	207.7	284.6
Mercury (ng/L)	2.8	1.7	-	7.76	10.64
Nickel (ug/L)	9.5	-	-	42.9	58.9
Selenium (ug/L)	10	5.1	-	27.7	38
Thallium (ug/L)	1.2	-	-	5.43	7.44
Zinc (ug/L)	40.4	26.9	-	112.1	153.5

Outfall 003	*Form 2C*		OEPA 3/2/09	PEQ$_{avg}$	PEQ$_{max}$
	Max	*Ave*			
Total Dissolved Solids	-	-	5910	26748.6	36642
Copper (ug/L)	32	11	34.1	74.7	102.3
Nickel (ug/L)	290	137	14.4	635.1	870
Selenium (ug/L)	6	-	5.8	16.6	22.8
Aluminum (ug/L)	472	-	223	1309.3	1793.6
Barium (ug/L)	27	-	28	77.7	106.4
Calcium	-	-	32	144.8	198.4
Hardness, Total	-	-	109	493.3	675.8
Magnesium	11.1	-	7	30.8	42.2
Potassium	-	-	7	31.7	43.4
Sodium	-	-	2520	11405.5	15624
Strontium (ug/L)	-	-	193	873.5	1196.6
Alkalinity	-	-	184	832.8	1140.8
Ammonia	5.8	5.8	0.061	12.7	17.4
Chloride	-	-	71.7	324.5	444.5
Conductivity (umhos/cm)	-	-	7790	35257.5	48298

Nitrate + Nitrite	78.1	-	104	288.5	395.2
TKN	0.271	-	0.35	0.97	1.33
Total Phosphorus	4.95	-	1.38	13.7	18.8
Diethyl phthalate (ug/L)	-	-	5.3	23.9	32.8
Biochemical Oxygen Demand	32.8	6.6	-	90.9	124.6
Chemical Oxygen Demand	89.9	28.4	-	249.4	341.6
Total Organic Carbon	4.18	-	-	18.9	25.9
Total Suspended Solids	31	14	-	86.0	117.8
Chlorine, TR	0.12	0.12	-	0.33	0.46
Oil & Grease	6.0	1.2	-	16.6	22.8
Sulfate	2450	-	-	11088.7	15190
Sulfite	2.56	-	-	11.6	15.87
Boron (ug/L)	128	-	-	579.3	793.6
Iron, Total	325	325	-	901.5	1235
Arsenic (ug/L)	2.3	-	-	10.41	14.26
Chromium (ug/L)	10	0.1	-	27.7	38
Lead, T.R. (ug/L)	5.7	3.2	-	15.8	21.6
Mercury (ng/L)	0.44	0.44	-	1.22	1.67
Zinc (ug/L)	51	31	-	141.5	193.8
Chloroform (ug/L)	0.8	-	-	3.62	4.96
Bis (2-Ethyl-hexyl) Phthalate (ug/L)	12	-	-	54.3	74.4
Outfall 004	***Form 2C***		**OEPA 3/2/09**	**PEQ_{avg}**	**PEQ_{max}**
	Max	***Ave***			
Total Organic Carbon	14.6	8.5	-	40.5	55.48
Total Suspended Solids	894	452	-	2480	3397.2
Nitrate + Nitrite	1.39	-	-	6.3	8.62
Oil & Grease	2.9	1.5	-	8.04	11.02
Sulfate	112	-	-	506.9	694.4
Sulfite	0.64	-	-	2.89	3.97
Barium	0.043	-	-	0.19	0.26
Magnesium	13.4	-	-	60.6	83.1
Manganese	0.05	-	-	0.23	0.31
Copper (ug/L)	0.003	-	-	0.013	0.02
Mercury (ng/L)	6.0	3.0	-	16.6	22.8
Nickel (ug/L)	14	-	-	63.4	86.8
Selenium (ug/L)	0.01	-	-	0.045	0.062
Zinc, Total (ug/L)	0.026	-		0.12	0.16
Chloroform (ug/L)	4.4	-	-	19.91	27.3
Chlorodibromomethane (ug/L)	0.63	-	-	2.85	3.9
Dichlorobromomethane (ug/L)	1.69	-	-	7.65	10.5

Table 2. Effluent Characterization and Decision Criteria

Summary of current permit limits and unaltered monthly operating report (MOR) data for Kraton Polymers Outfalls 001, 002, 003, 004. All values are based on annual records unless otherwise indicated. Decision Criteria: PEQ_{avg} = monthly average; PEQ_{max} = daily maximum analytical results.

			Current Permit Limits			Percentiles			Decision Criteria		
Parameter	**Season**	**Units**	**30 day**	**Daily[1]**	**# Obs.**	**50th**	**95th**	**Data Range**	**# Obs.**	**PEQ_{ave}**	**PEQ_{max}**
Outfall 001											
Water Temperature	Annual	F			1795	80	106	42-111	1795	85.543	114.89
Thermal Discharge	Annual	Million BTU/Hr	--	281.64	1795	88	128	24-196	1795	98.48	156.21
Chemical Oxygen Demand (Low Level)	Annual	mg/l			255	0	20.9	0-98.4	255	19.155	28.229
pH	Annual	S.U.	6.0 min	9.0 max	254	7.8	8.4	6.68-8.62	254	8.1114	8.4131
Total Suspended Solids	Annual	mg/l		50 max	255	5	28.2	0-54	255	18.543	27.643
Oil and Grease, Total	Annual	mg/l			30	0	0	0-0	30	--	--
Oil and Grease, Hexane Extr Method	Annual	mg/l	15	20	232	0	0	0-38.5	231	1.1851	1.4868
Copper, Total Recoverable	Annual	ug/l			2	3.25	6.18	0-6.5	2	18.03	24.7
Flow Rate	Summer	MGD			920	12.3	12.9	11.1-14			
Flow Rate	Winter	MGD			875	12.3	12.9	11.9-14			
Flow Rate	Annual	MGD			1795	12.3	12.9	11.1-14	1795	12.449	12.9
Acute Toxicity, Ceriodaphnia dubia	Annual	TUa			6	0	0.0775	0-0.1	6	0.1533	0.21
Acute Toxicity, Pimephales promelas	Annual	TUa			6	0	0.075	0-0.1	6	0.1533	0.21
Outfall 002											
pH	Annual	S.U.	6.5 min	9.0 max	260	7.51	8.24	6.98-8.71	260	7.9079	8.2707
Total Suspended Solids	Annual	mg/l	30	100	271	3	26	0-60	271	18.956	27.571
Oil and Grease, Total	Annual	mg/l			30	0	0	0-0	30	--	--

Oil and Grease, Hexane Extr Method	Annual	mg/l			224	0	0	0-5.61	224	2.867	3.927
Arsenic, Total Recoverable	Annual	ug/l	100	150	275	21.7	92.6	0-219	275	60.784	96.544
Selenium, Total Recoverable	Annual	ug/l			256	1.9	4.33	0-10	256	3.5404	5.1107
Zinc, Total Recoverable	Annual	ug/l			251	0	19.4	0-40.4	251	14.3	21.44
Copper, Total Recoverable	Annual	ug/l			54	6.35	24.5	0-74.9	54	20.48	32.584
Manganese, Total Recoverable	Annual	ug/l			7	42	96.4	23-97	7	141.6	194
Flow Rate	Summer	MGD			917	1.32	1.51	0-1.84			
Flow Rate	Winter	MGD			875	1.33	1.52	0.39-1.83			
Flow Rate	Annual	MGD			1792	1.33	1.51	0-1.84	1792	1.4366	2.0026
Chlorine, Total Residual	Annual	mg/l			61	0	0.002	0-0.07	61	0.0511	0.07

Outfall 003

Biochemical Oxygen Demand, 5 Day	Summer	mg/l	24	64	129	0	2.84	0-13	85	3.7952	4.8265
Biochemical Oxygen Demand, 5 Day	Winter	mg/l	24	64	125	0	2.58	0-32.8	60	2.3425	3.7068
Chemical Oxygen Demand (Low Level)	Annual	mg/l			254	10.5	28.7	0-89.9	254	22.634	33.136
Total Suspended Solids	Annual	mg/l	40	130	254	3	10.2	0-31	254	8.0876	12.071
Oil and Grease, Total	Annual	mg/l			26	0	0	0-0	26	--	--
Oil and Grease, Hexane Extr Method	Annual	mg/l	15	20	228	0	0	0-6.5	228	1.1613	0.90245
Nitrogen, Ammonia (NH3)	Summer	mg/l			30	0.152	0.855	0-1.2	20	0.56946	0.99252
Nitrogen, Ammonia (NH3)	Winter	mg/l			30	0.176	2.66	0-5.79	14	0.97166	1.8207
Iron, Total Recoverable	Annual	ug/l			60	0	115	0-325	60	134.72	161.97
Chromium, Total (Cr)	Annual	ug/l	231	576	254	0	0	0-10	252	2.0731	2.5461
Nickel, Total Recoverable	Annual	ug/l	351	827	254	25.3	117	0-290	254	105.3	156.92
Zinc, Total Recoverable	Annual	ug/l	218	320	254	0	17.1	0-34.5	254	12.442	18.656
Lead, Total Recoverable	Annual	ug/l	67	143	254	0	0.875	0-5.4	254	1.9188	2.8702
Copper, Total Recoverable	Annual	ug/l	--	40	254	0	3.52	0-32.4	252	2.6297	3.5558
Carbon Tetrachloride	Annual	ug/l	18	38	6	0	0	0-0	6	--	--
Chloroform	Annual	ug/l	21	46	6	0.26	0.773	0-0.83	6	1.272	1.743
Toluene	Annual	ug/l	26	80	7	0	0	0-0	7	--	--

Benzene	Annual	ug/l	37	136	8	0	0	0-0	8	--	--
Acenaphthylene	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
Acenaphthene	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
Acrylonitrile	Annual	ug/l	96	242	6	0	0	0-0	6	--	--
Anthracene, General Organic	Annual	ug/l	--	0.46 max	6	0	0	0-0	6	--	--
3,4-BenzoFluoranthene	Annual	ug/l	23	61	6	0	0	0-0	6	--	--
Benzo(k)Fluoranthene	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
Benzo-A-Pyrene	Annual	ug/l	23	61	6	0	0	0-0	6	--	--
Chlorobenzene	Annual	ug/l	15	28	6	0	0	0-0	6	--	--
Chloroethane	Annual	ug/l	104	268	6	0	0	0-0	6	--	--
Chrysene	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
Diethyl phthalate	Annual	ug/l	81	203	6	0	0	0-0	6	--	--
Dimethyl phthalate	Annual	ug/l	19	47	6	0	0	0-0	6	--	--
Ethylbenzene	Annual	ug/l	32	108	8	0	0	0-0	8	--	--
Fluoranthene	Annual	ug/l	25	68	6	0	0	0-0	6	--	--
Fluorene	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
Hexachloroethane	Annual	ug/l	21	54	6	0	0	0-0	6	--	--
Methyl Chloride	Annual	ug/l	86	190	6	0	0	0-0	6	--	--
Methylene Chloride	Annual	ug/l	40	89	6	0	0	0-0	6	--	--
Nitrobenzene	Annual	ug/l	27	68	6	0	0	0-0	6	--	--
Phenanthrene	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
Pyrene	Annual	ug/l	25	67	6	0	0	0-0	6	--	--
Tetrachloroethylene	Annual	ug/l	22	56	5	0	0	0-0	5	--	--
1,1-Dichloroethane	Annual	ug/l	68	211	6	0	0	0-0	6	--	--
1,1-Dichloroethylene	Annual	ug/l	16	25	6	0	0	0-0	6	--	--
1,1,1-Trichloroethane	Annual	ug/l	21	54	6	0	0	0-0	6	--	--
1,1,2-Trichloroethane	Annual	ug/l	21	54	6	0	0	0-0	6	--	--
Benzo(A)Anthracene	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
1,2-Dichloroethane	Annual	ug/l	22	59	6	0	0	0-0	6	--	--
1,2-Dichlorobenzene	Annual	ug/l	77	163	6	0	0	0-0	6	--	--
1,2-Dichloropropane	Annual	ug/l	153	230	6	0	0	0-0	6	--	--

1,2-trans-Dichloroethylene	Annual	ug/l	21	54	6	0	0	0-0	6	--	--
1,2,4-Trichlorobenzene	Annual	ug/l	68	140	6	0	0	0-0	6	--	--
1,3-Dichlorobenzene	Annual	ug/l	31	44	6	0	0	0-0	6	--	--
1,4-Dichlorobenzene	Annual	ug/l	15	28	6	0	0	0-0	6	--	--
2-Chlorophenol	Annual	ug/l	31	98	6	0	0	0-0	6	--	--
2-Nitrophenol	Annual	ug/l	41	69	6	0	0	0-0	6	--	--
2,4-Dichlorophenol	Annual	ug/l	39	112	6	0	0	0-0	6	--	--
2,4-Dimethylphenol	Annual	ug/l	18	36	6	0	0	0-0	6	--	--
2,4-Dinitrotoluene	Annual	ug/l	113	285	6	0	0	0-0	6	--	--
2,4-Dinitrophenol	Annual	ug/l	71	123	6	0	0	0-0	6	--	--
2,6-Dinitrotoluene	Annual	ug/l	255	641	6	0	0	0-0	6	--	--
4-Nitrophenol	Annual	ug/l	72	124	5	0	0	0-0	5	--	--
4,6-Dinitro-o-cresol	Annual	ug/l	78	277	6	0	0	0-0	6	--	--
Phenol	Annual	ug/l	15	26	6	0	0	0-0	6	--	--
Naphthalene	Annual	ug/l	22	59	8	0	0	0-0	8	--	--
Bis(2-ethylhexyl) Phthalate	Annual	ug/l	103	279	6	0	9	0-12	6	18.4	25.2
Di-N-Butylphthalate	Annual	ug/l	27	57	6	0	0	0-0	6	--	--
Vinyl Chloride	Annual	ug/l	104	268	6	0	0	0-0	6	--	--
Trichloroethylene	Annual	ug/l	21	54	6	0	0	0-0	6	--	--
Hexachlorobenzene	Annual	ug/l	15	28	6	0	0	0-0	6	--	--
Hexachlorobutadiene	Annual	ug/l	20	49	6	0	0	0-0	6	--	--
Flow Rate	Summer	MGD			920	0.8	1	0.03-1.9			
Flow Rate	Winter	MGD			875	0.8	1	0.2-1.3			
Flow Rate	Annual	MGD			1795	0.8	1	0.03-1.9	1795	0.83767	1.1368
Chlorine, Total Residual	Annual	mg/l	--	0.038	233	0	0.01	0-0.05	233	0.011088	0.012296
Acute Toxicity, Ceriodaphnia dubia	Annual	TUa			6	1.5	2.48	1.3-2.7	6	4.139	5.67
Acute Toxicity, Pimephales promelas	Annual	TUa			6	0	0.0775	0-0.1	6	0.1533	0.21
pH, Maximum	Annual	S.U.	9.0		1795	7.8	8.1	7.2-8.95	1795	7.8968	8.0787
pH, Minimum	Annual	S.U.	6.0		1795	7.8	7.93	6.54-8.6	1795	7.8134	7.9919
Toluene	Annual	mg/l			1	0	0	0-0	1	--	--
Styrene, Total	Annual	ug/l			8	0	0	0-0	8	--	--

1,3-Dichloropropylene	Annual	ug/l	--	24	6	0	0	0-0	6	--	--
Ethylene Dibromide	Annual	ug/l			8	0	0	0-0	8	--	--
Tetrachloroethene	Annual	ug/l			1	0	0	0-0	1	--	--
<u>Outfall 004</u>											
Total Suspended Solids	Annual	mg/l			125	0	62.7	0-894	122	42.292	47.159
Oil and Grease, Total	Annual	mg/l			15	0	0	0-0	15	--	--
Oil and Grease, Hexane Extr Method	Annual	mg/l			114	0	0	0-2.9	114	1.694	2.32
Carbon, Total Organic (TOC)	Annual	mg/l			124	3.24	5.74	1-14.6	124	5.0873	6.9154
Flow Rate	Summer	MGD			63	0.012	1.31	0.002-3.76			
Flow Rate	Winter	MGD			62	0.027	0.686	0.004-1.91			
Flow Rate	Annual	MGD			125	0.02	1.16	0.002-3.76	125	0.9781	1.038

Table 3: Effluent Data and Projected Effluent Quality Values for Outfalls 001, 002, 003

Parameter	Units	Number of Samples	Number > MDL	PEQ Average	PEQ Maximum
Outfall 001					
Antimony	ug/l	1	1	7.957	10.9
Chlorodibromomethane	ug/l	1	1	1.971	2.7
Dichlorobromomethane	ug/l	1	1	6.38166	8.742
Manganese - TR	ug/l	2	2	302.366	414.2
Titanium	ug/l	1	1	0.167462	0.2294
Aluminum	ug/l	2	2	2363.448	3237.6
Ammonia-S	mg/l	2	2	0.39639	0.543
Arsenic - TR	ug/l	2	2	153.957	210.9
Barium	ug/l	2	2	144.8028	198.36
Boron	ug/l	1	1	0.466178	0.6386
Chlorides	mg/l	1	1	244.404	334.8
Chloroform (Trichloromethane)	ug/l	2	2	11.87272	16.264
Chromium - TR	ug/l	1	1	13.44222	18.414
Copper - TR	ug/l	4	3	14.78542	20.254
Dissolved solids (ave)	mg/l	1	1	1203.916	1649.2
Iron - TR	ug/l	2	2	2995.92	4104
Lead - TR	ug/l	1	1	9.82142	13.454
Magnesium	mg/l	2	2	29.127	39.9
Mercury - TR (BPO)	ng/l	15	1	12.045	16.5
Mercury - TR (APO)	ng/l	15	1	12.045	16.5
Nickel - TR	ug/l	2	2	15.83954	21.698
Nitrate-N + Nitrite-N	mg/l	2	2	4.18874	5.738
Oil & grease	mg/l	31	1	33.726	46.2
Phosphorus	mg/l	1	1	0.357554	0.4898
Selenium - TR	ug/l	1	1	5.29542	7.254
Strontium	ug/l	1	1	792.05	1085
Sulfates	mg/l	1	1	387.8782	531.34
Sulfide	mg/l	1	1	2.89664	3.968
TKN	mg/l	2	2	0.77672	1.064
Zinc - TR	ug/l	1	1	45.26	62
Outfall 002					
Arsenic - TR	ug/l	275	274	60.784	96.544
Chlorine (wwh) - TRes	mg/l	61	4	0.0511	0.07
Copper - TR	ug/l	54	50	20.48	32.584
Manganese - TR	ug/l	7	7	141.62	194

Oil & grease	mg/l	271	144	18.956	27.571
Selenium - TR	ug/l	256	191	3.5404	5.1107
Zinc - TR	ug/l	251	105	14.3	21.44
Aluminum	ug/l	2	2	2363.448	3237.6
Ammonia-S	mg/l	2	2	0.396682	0.5434
Barium	ug/l	2	2	144.8028	198.36
Boron	ug/l	1	1	0.466178	0.6386
Chlorides	mg/l	1	1	244.404	334.8
Chloroform (Trichloromethane)	ug/l	2	2	11.87272	16.264
Chromium - TR	ug/l	1	1	13.44222	18.414
Copper - TR	ug/l	4	3	14.78542	20.254
Dissolved solids (ave)	mg/l	1	1	1203.916	1649.2
Iron - TR	ug/l	2	2	2995.92	4104
Lead - TR	ug/l	1	1	9.82142	13.454
Magnesium	mg/l	2	2	29.127	39.9
Manganese - TR	ug/l	7	7	141.62	194
Mercury - TR (BPO)	ng/l	15	1	12.045	16.5
Mercury - TR (APO)	ng/l	15	1	12.045	16.5
Nickel - TR	ug/l	2	2	15.83954	21.698
Nitrate-N + Nitrite-N	mg/l	2	2	4.18874	5.738
Oil & grease	mg/l	271	144	18.956	27.571
Phosphorus	mg/l	1	1	0.357554	0.4898
Selenium - TR	ug/l	256	191	3.5404	5.1107
Strontium	ug/l	1	1	792.05	1085
Sulfates	mg/l	1	1	387.8782	531.34
Sulfide	mg/l	1	1	2.89664	3.968
TKN	mg/l	2	2	0.77672	1.064
Outfall 003					
Acenaphthene	ug/l	6	0	--	--
Acenaphthylene	ug/l	6	0	--	--
Acrylonitrile	ug/l	6	0	--	--
Anthracene	ug/l	6	0	--	--
Benzene	ug/l	8	0	--	--
Benzo(a)anthracene	ug/l	6	0	--	--
Benzo(a)pyrene	ug/l	6	0	--	--
Benzo(k)fluoranthene	ug/l	6	0	--	--
Bis(2-ethylhexyl)phthalate	ug/l	6	1	18.396	25.2
Carbon tetrachloride	ug/l	6	0	--	--

Chlorine (wwh) - TRes	mg/l	233	14	0.011	0.012
Chlorobenzene	ug/l	6	0	--	--
2-Chlorophenol	ug/l	6	0	--	--
Chrysene	ug/l	6	0	--	--
Di-n-butyl phthalate	ug/l	6	0	--	--
1,2-Dichlorobenzene	ug/l	6	0	--	--
1,3-Dichlorobenzene	ug/l	6	0	--	--
1,4-Dichlorobenzene	ug/l	6	0	--	--
1,1-Dichloroethane	ug/l	6	0	--	--
1,2-Dichloroethane	ug/l	6	0	--	--
1,1-Dichloroethylene	ug/l	6	0	--	--
trans-1,2-Dichloroethylene	ug/l	6	0	--	--
2,4-Dichlorophenol	ug/l	6	0	--	--
1,2-Dichloropropane	ug/l	6	0	--	--
Diethyl phthalate	ug/l	6	0	--	--
Dimethyl phthalate	ug/l	6	0	--	--
4,6-Dinitro-o-cresol	ug/l	6	0	--	--
Dinitrophenols	ug/l	6	0	--	--
2,4-Dinitrotoluene	ug/l	6	0	--	--
2,6-Dinitrotoluene	ug/l	6	0	--	--
Ethylbenzene	ug/l	8	0	--	--
Ethylene dibromide (EDB)	ug/l	8	0	--	--
Fluoranthene	ug/l	6	0	--	--
Fluorene	ug/l	6	0	--	--
Hexachlorobenzene (BPO)	ug/l	6	0	--	--
Hexachlorobenzene (APO)	ug/l	6	0	--	--
Hexachlorobutadiene (BPO)	ug/l	6	0	--	--
Hexachlorobutadiene (APO)	ug/l	6	0	--	--
Hexachloroethane	ug/l	6	0	--	--
Methylene chloride	ug/l	6	0	--	--
Naphthalene	ug/l	8	0	--	--
Nitrobenzene	ug/l	6	0	--	--
2-Nitrophenol	ug/l	6	0	--	--
Phenanthrene	ug/l	6	0	--	--
Phenol (wwh)	ug/l	6	0	--	--
Pyrene	ug/l	6	0	--	--
Styrene	ug/l	8	0	--	--
Tetrachloroethylene	ug/l	5	0	--	--
Toluene	ug/l	1	0	--	--

1,2,4-Trichlorobenzene	ug/l	6	0	--	--
1,1,1-Trichloroethane	ug/l	6	0	--	--
1,1,2-Trichloroethane	ug/l	6	0	--	--
Trichloroethylene	ug/l	6	0	--	--
Vinyl chloride	ug/l	6	0	--	--
Aluminum	ug/l	2	2	1309.328	1793.6
Ammonia-S	mg/l	23	22	5.5042	7.54
Arsenic - TR	ug/l	1	1	10.4098	14.26
Barium	ug/l	2	2	77.672	106.4
Boron	ug/l	1	1	579.328	793.6
Chlorides	mg/l	1	1	324.5142	444.54
Chloroform (Trichloromethane)	ug/l	7	6	1.2118	1.66
Chromium - TR	ug/l	253	8	5.11	7
Copper - TR	ug/l	2	2	94.5934	129.58
Dissolved solids (ave)	mg/l	1	1	26748.66	36642
Iron - TR	ug/l	61	16	237.25	325
Lead - TR	ug/l	255	14	2.0951	2.87
Magnesium	mg/l	2	2	30.7914	42.18
Mercury - TR (BPO)	ng/l	15	1	0.4818	0.66
Mercury - TR (APO)	ng/l	15	1	0.4818	0.66
Nickel - TR	ug/l	256	251	114.5516	156.92
Nitrate-N + Nitrite-N	mg/l	2	2	288.496	395.2
Oil & grease	mg/l	27	1	5.256	7.2
Phosphorus	mg/l	2	2	13.7313	18.81
Selenium - TR	ug/l	2	2	16.644	22.8
Strontium	ug/l	1	1	873.518	1196.6
Sulfates	mg/l	1	1	11088.7	15190
Sulfide	mg/l	1	1	11.58656	15.872
TKN	mg/l	2	2	0.9709	1.33
Zinc - TR	ug/l	255	114	13.6145	18.65

BPO – means Before Phase Out
APO – means After Phase Out

Table 4: Water Quality Criteria in the Study Area: Outfall 001, 002, 003

Parameter	Units	Outside Mixing Zone Criteria: Average: Human Health	Outside Mixing Zone Criteria: Average: Agri-culture	Outside Mixing Zone Criteria: Average: Aquatic Life	Outside Mixing Zone Criteria: Maximum Aquatic Life	Inside Mixing Zone Maximum
Outfall 001						
Antimony	ug/l	14	--	190	900	1800
Chlorodibromomethane	ug/l	4.1_c	--	--	--	--
Dichlorobromomethane	ug/l	5.6_c	--	--	--	--
Manganese - TR	ug/l	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--
Aluminum	ug/l	--	--	--	--	--
Ammonia-S	mg/l	--	--	--	--	--
Arsenic - TR	ug/l	50	100	150	340	680
Barium	ug/l	--	--	220	2000	4000
Boron	ug/l	--	--	3900	33000	65000
Chlorides	mg/l	250	--	--	--	--
Chloroform (Trichloromethane)	ug/l	57_c	--	140	1300	2600
Chromium - TR	ug/l	--	100	100	2100	4200
Copper - TR	ug/l	1300	500	11	17	33
Dissolved solids (ave)	mg/l	--	--	1500	--	--
Iron - TR	ug/l	--	5000	--	--	--
Lead - TR	ug/l	--	100	8.1	150	310
Magnesium	mg/l	--	--	--	--	--
Mercury - TR (BPO)	ng/l	12	10000	910	1700	3400
Mercury - TR (APO)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	610	200	61	550	1100
Nitrate-N + Nitrite-N	mg/l	10	100	--	--	--
Oil & grease	mg/l	--	--	--	10	--
Phosphorus	mg/l	--	--	--	--	--
Selenium - TR	ug/l	170	50	5	--	--
Strontium	ug/l	--	--	21000	40000	81000
Sulfates	mg/l	250	--	--	--	--
Sulfide	mg/l	--	--	--	--	--
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	9100	25000	140	140	280
Outfall 002						
Arsenic - TR	ug/l	50	100	150	340	680
Chlorine (wwh) - TRes	mg/l	--	--	0.011	0.019	0.038
Copper - TR	ug/l	1300	500	11	17	33
Manganese - TR	ug/l	--	--	--	--	--

Oil & grease	mg/l	--	--	--	10	--
Selenium - TR	ug/l	170	50	5	--	--
Zinc - TR	ug/l	9100	25000	140	140	280
Aluminum	ug/l	--	--	--	--	--
Ammonia-S	mg/l	--	--	--	--	--
Arsenic - TR	ug/l	--	100	150	340	680
Barium	ug/l	--	--	220	2000	4000
Boron	ug/l	--	--	3900	33000	65000
Chlorides	mg/l	--	--	--	--	--
Chlorine (wwh,ewh, mwh,cwh) - TRes	mg/l	--	--	0.011	0.019	0.038
Chloroform (Trichloromethane)	ug/l	4700_c	--	140	1300	2600
Chromium - TR	ug/l	--	100	100	2100	4200
Copper - TR	ug/l	1300	500	11	17	33
Dissolved solids (ave)	mg/l	--	--	1500	--	--
Iron - TR	ug/l	--	5000	--	--	--
Lead - TR	ug/l	--	100	8.1	150	310
Magnesium	mg/l	--	--	--	--	--
Manganese - TR	ug/l	--	--	--	--	--
Mercury - TR (BPO)	ng/l	12	10000	910	1700	3400
Mercury - TR (APO)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	4600	200	61	550	1100
Nitrate-N + Nitrite-N	mg/l	--	100	--	--	--
Oil & grease	mg/l	--	--	--	10	--
Phosphorus	mg/l	--	--	--	--	--
Selenium - TR	ug/l	11000	50	5	--	--
Strontium	ug/l	--	--	21000	40000	81000
Sulfates	mg/l	--	--	--	--	--
Sulfide	mg/l	--	--	--	--	--
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	69000	25000	140	140	280
Outfall 003						
Aluminum	ug/l	--	--	--	--	--
Ammonia-S	mg/l	--	--	--	--	--
Arsenic - TR	ug/l	50	100	150	340	680
Barium	ug/l	--	--	220	2000	4000
Boron	ug/l	--	--	3900	33000	65000
Chlorides	mg/l	250	--	--	--	--
Chloroform (Trichloromethane)	ug/l	57_c	--	140	1300	2600
Chromium - TR	ug/l	--	100	100	2100	4200
Copper - TR	ug/l	1300	500	11	17	33
Dissolved solids (ave)	mg/l	--	--	1500	--	--

Iron - TR	ug/l	--	5000	--	--	--
Lead - TR	ug/l	--	100	8.1	150	310
Magnesium	mg/l	--	--	--	--	--
Mercury - TR (BPO)	ng/l	12	10000	910	1700	3400
Mercury - TR (APO)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	610	200	61	550	1100
Nitrate-N + Nitrite-N	mg/l	10	100	--	--	--
Oil & grease	mg/l	--	--	--	10	--
Phosphorus	mg/l	--	--	--	--	--
Selenium - TR	ug/l	170	50	5	--	--
Strontium	ug/l	--	--	21000	40000	81000
Sulfates	mg/l	250	--	--	--	--
Sulfide	mg/l	--	--	--	--	--
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	9100	25000	140	140	280
Acenaphthene	ug/l	1200	--	15	19	38
Acenaphthylene	ug/l	--	--	--	--	--
Acrylonitrile	ug/l	0.59_c	--	78	650	1300
Anthracene	ug/l	9600	--	0.02	0.18	0.35
Benzene	ug/l	12_c	--	160	700	1400
Benzo(a)anthracene	ug/l	0.044_c	--	--	--	--
Benzo(a)pyrene	ug/l	0.044_c	--	--	--	--
Benzo(k)fluoranthene	ug/l	0.044_c	--	--	--	--
Bis(2-ethylhexyl)phthalate	ug/l	18_c	--	8.4	1100	2100
Carbon tetrachloride	ug/l	2.5_c	--	240	2200	4400
Chlorine (wwh) - TRes	mg/l	--	--	0.011	0.019	0.038
Chlorobenzene	ug/l	680	--	47	420	850
2-Chlorophenol	ug/l	120	--	32	290	580
Chrysene	ug/l	0.044_c	--	--	--	--
Di-n-butyl phthalate	ug/l	2700	--	--	--	--
1,2-Dichlorobenzene	ug/l	2700	--	23	130	260
1,3-Dichlorobenzene	ug/l	400	--	22	79	160
1,4-Dichlorobenzene	ug/l	400	--	9.4	57	110
1,1-Dichloroethane	ug/l	--	--	--	--	--
1,2-Dichloroethane	ug/l	3.8_c	--	2000	9600	19000
1,1-Dichloroethylene	ug/l	0.57_c	--	210	1900	3800
trans-1,2-Dichloroethylene	ug/l	700	--	--	--	--
2,4-Dichlorophenol	ug/l	93	--	11	110	210
1,2-Dichloropropane	ug/l	5.2_c	--	520	3300	6500
Diethyl phthalate	ug/l	23000	--	220	980	2000
Dimethyl phthalate	ug/l	310000	--	1100	3200	6400
4,6-Dinitro-o-cresol	ug/l	13	--	--	--	--

Dinitrophenols	ug/l	70	--	--	--	--
2,4-Dinitrotoluene	ug/l	1.1_c	--	44	390	790
2,6-Dinitrotoluene	ug/l	--	--	81	730	1500
Ethylbenzene	ug/l	3100	--	61	550	1100
Ethylene dibromide (EDB)	ug/l	--	--	--	--	--
Fluoranthene	ug/l	300	--	0.8	3.7	7.4
Fluorene	ug/l	1300	--	19	110	220
Hexachlorobenzene (BPO)	ug/l	0.0075_c	--	--	--	--
Hexachlorobenzene (APO)	ug/l	0.0075_c	--	--	--	--
Hexachlorobutadiene (BPO)	ug/l	4.4_c	--	--	--	--
Hexachlorobutadiene (APO)	ug/l	4.4_c	--	--	--	--
Hexachloroethane	ug/l	19_c	--	--	--	--
Methylene chloride (Dichloromethane)	ug/l	47_c	--	1900	11000	22000
Naphthalene	ug/l	--	--	21	170	340
Nitrobenzene	ug/l	17	--	380	2000	4000
2-Nitrophenol	ug/l	--	--	73	650	1300
Phenanthrene	ug/l	--	--	2.3	31	61
Phenol (wwh)	ug/l	21000	--	400	4700	9400
Pyrene	ug/l	960	--	4.6	42	83
Styrene	ug/l	--	--	32	290	570
Tetrachloroethylene	ug/l	8_c	--	53	430	850
Toluene	ug/l	6800	--	62	560	1100
1,2,4-Trichlorobenzene	ug/l	260	--	--	--	--
1,1,1-Trichloroethane	ug/l	--	--	76	690	1400
1,1,2-Trichloroethane	ug/l	6_c	--	740	3300	6600
Trichloroethylene	ug/l	27_c	--	220	2000	4000
Vinyl chloride	ug/l	20_c	--	930	8400	17000

Note: "c" means carcinogen
Note: "BPO" means Before Phase Out
Note: "APO" means After Phase Out

Table 5. Summary of Effluent Limits to Maintain Applicable Water Quality Standards

Parameter	Units	Outside Mixing Zone Criteria				Inside Mixing Zone Maximum
		Average			Maximum Aquatic Life	
		Human Health	Agri-culture	Aquatic Life		
Outfall 001						
Antimony	ug/l	4700	--	6549	3912	1800
Chlorodibromomethane	ug/l	517	--	--	--	--
Dichlorobromomethane	ug/l	706	--	--	--	--
Manganese - TR	ug/l	--	--	--	--	--
Titanium	ug/l	--	--	--	--	--
Aluminum	ug/l	--	--	--	--	--
Ammonia-S	mg/l	--	--	--	--	--
Arsenic - TR	ug/l	15209	11576	4779	1394	680
Barium	ug/l	--	--	5419	8062	4000
Boron	ug/l	--	--	125324	135743	65000
Chlorides	mg/l	78086	--	--	--	--
Chloroform (Trichloromethane)	ug/l	6685	--	4499	5347	2600
Chromium - TR	ug/l	--	11463	3142	8631	4200
Copper - TR	ug/l	404688	58132	218	56	33
Dissolved solids (ave)	mg/l	--	--	35685	--	--
Iron - TR	ug/l	--	360465	--	--	--
Lead - TR	ug/l	--	11367	164	607	310
Magnesium	mg/l	--	--	--	--	--
Mercury - TR (BPO)	ng/l	572	1171605	28925	6961	3400
Mercury - TR (APO)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	188034	22524	1711	2237	1100
Nitrate-N + Nitrite-N	mg/l	2681	11563	--	--	--
Oil & grease	mg/l	--	--	--	41	--
Phosphorus	mg/l	--	--	--	--	--
Selenium - TR	ug/l	52757	5737	127	--	--
Strontium	ug/l	--	--	671084	164164	81000
Sulfates	mg/l	40725	--	--	--	--
Sulfide	mg/l	--	--	--	--	--
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	2832280	2928226	3495	475	280
Outfall 002						
Arsenic - TR	ug/l	204735	414977	167516	381570	680
Chlorine (wwh) - TRes	mg/l	--	--	0.011	0.019	0.038
Copper - TR	ug/l	5447964	2084089	7484	14243	33
Manganese - TR	ug/l	--	--	--	--	--
Oil & grease	mg/l	--	--	--	11266	--
Selenium - TR	ug/l	710216	205635	4399	--	--
Zinc - TR	ug/l	38128477	104985489	121417	121417	280
Aluminum	ug/l	--	--	--	--	--

Ammonia-S	mg/l	--	--	--	--	--
Arsenic - TR	ug/l	--	414977	167516	381570	680
Barium	ug/l	--	--	188195	2193544	4000
Boron	ug/l	--	--	4393742	37177818	65000
Chlorides	mg/l	--	--	--	--	--
Chlorine (wwh,ewh, mwh,cwh) - TRes	mg/l	--	--	12	21	0.038
Chloroform (Trichloromethane)	ug/l	19762765	--	157724	1464581	2600
Chromium - TR	ug/l	--	410900	110094	2363295	4200
Copper - TR	ug/l	5447964	2084089	7484	14243	33
Dissolved solids (ave)	mg/l	--	--	1237409	--	--
Iron - TR	ug/l	--	12856150	--	--	--
Lead - TR	ug/l	--	407452	5636	165501	310
Magnesium	mg/l	--	--	--	--	--
Manganese - TR	ug/l	--	--	--	--	--
Mercury - TR (BPO)	ng/l	7579	42005556	1013725	1903740	3400
Mercury - TR (APO)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	19308591	807279	59702	610610	1100
Nitrate-N + Nitrite-N	mg/l	--	414515	--	--	--
Oil & grease	mg/l	--	--	--	11266	--
Phosphorus	mg/l	--	--	--	--	--
Selenium - TR	ug/l	46248671	205635	4399	--	--
Strontium	ug/l	--	--	23523539	44928950	81000
Sulfates	mg/l	--	--	--	--	--
Sulfide	mg/l	--	--	--	--	--
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	289998603	104985489	121417	121417	280
Outfall 003						
Acenaphthene	ug/l	5430166	--	6801	879	38
Acenaphthylene	ug/l	--	--	--	--	--
Acrylonitrile	ug/l	997	--	35366	30057	1300
Anthracene	ug/l	43441324	--	9.1	8.3	0.35
Benzene	ug/l	20288	--	72546	32369	1400
Benzo(a)anthracene	ug/l	74	--	--	--	--
Benzo(a)pyrene	ug/l	74	--	--	--	--
Benzo(k)fluoranthene	ug/l	74	--	--	--	--
Bis(2-ethylhexyl)phthalate	ug/l	30432	--	3809	50866	2100
Carbon tetrachloride	ug/l	4227	--	108819	101731	4400
Chlorine (wwh) - TRes	mg/l	--	--	0.011	0.019	0.038
Chlorobenzene	ug/l	3077094	--	21310	19421	850
2-Chlorophenol	ug/l	543017	--	14509	13410	580
Chrysene	ug/l	74	--	--	--	--
Di-n-butyl phthalate	ug/l	12217872	--	--	--	--
1,2-Dichlorobenzene	ug/l	12217872	--	10429	6011	260
1,3-Dichlorobenzene	ug/l	1810055	--	9975	3653	160
1,4-Dichlorobenzene	ug/l	1810055	--	4262	2636	110
1,1-Dichloroethane	ug/l	--	--	--	--	--

1,2-Dichloroethane	ug/l	6424	--	906828	443917	19000
1,1-Dichloroethylene	ug/l	964	--	95217	87859	3800
trans-1,2-Dichloroethylene	ug/l	3167597	--	--	--	--
2,4-Dichlorophenol	ug/l	420838	--	4988	5087	210
1,2-Dichloropropane	ug/l	8791	--	235775	152597	6500
Diethyl phthalate	ug/l	104078172	--	99751	45317	2000
Dimethyl phthalate	ug/l	1402792759	--	498755	147972	6400
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	ug/l	58827	--	--	--	--
Dinitrophenols	ug/l	316760	--	--	--	--
2,4-Dinitrotoluene	ug/l	1860	--	19950	18034	790
2,6-Dinitrotoluene	ug/l	--	--	36727	33756	1500
Ethylbenzene	ug/l	14027928	--	27658	25433	1100
Ethylene dibromide (EDB)	ug/l	--	--	--	--	--
Fluoranthene	ug/l	1357541	--	363	171	7.4
Fluorene	ug/l	5882679	--	8615	5087	220
Hexachlorobenzene (BPO)	ug/l	13	--	--	--	--
Hexachlorobenzene (APO)	ug/l	0.0075	--	--	--	--
Hexachlorobutadiene (BPO)	ug/l	7439	--	--	--	--
Hexachlorobutadiene (APO)	ug/l	4.4	--	--	--	--
Hexachloroethane	ug/l	32122	--	--	--	--
Methylene chloride (Dichloromethane)	ug/l	79461	--	861486	508655	22000
Naphthalene	ug/l	--	--	9522	7861	340
Nitrobenzene	ug/l	76927	--	172297	92483	4000
2-Nitrophenol	ug/l	--	--	33099	30057	1300
Phenanthrene	ug/l	--	--	1043	1433	61
Phenol (wwh)	ug/l	95000752	--	178651	217063	9400
Pyrene	ug/l	4344132	--	2086	1942	83
Styrene	ug/l	--	--	14509	13410	570
Tetrachloroethylene	ug/l	13525	--	24031	19884	850
Toluene	ug/l	30770938	--	28112	25895	1100
1,2,4-Trichlorobenzene	ug/l	1176536	--	--	--	--
1,1,1-Trichloroethane	ug/l	--	--	34459	31907	1400
1,1,2-Trichloroethane	ug/l	10144	--	335526	152597	6600
Trichloroethylene	ug/l	45648	--	99751	92483	4000
Vinyl chloride	ug/l	33813	--	421675	388428	17000
Aluminum	ug/l	--	--	--	--	--
Ammonia-S	mg/l	--	--	--	--	--
Arsenic - TR	ug/l	15209	11576	4779	1394	680
Barium	ug/l	--	--	5419	8062	4000
Boron	ug/l	--	--	125324	135743	65000
Chlorides	mg/l	78086	--	--	--	--
Chloroform (Trichloromethane)	ug/l	6685	--	4499	5347	2600
Chromium - TR	ug/l	--	11463	3142	8631	4200
Copper - TR	ug/l	404688	58132	218	56	33
Dissolved solids (ave)	mg/l	--	--	35685	--	--
Iron - TR	ug/l	--	360465	--	--	--

Lead - TR	ug/l	--	11367	164	607	310
Magnesium	mg/l	--	--	--	--	--
Mercury - TR (BPO)	ng/l	572	1171605	28925	6961	3400
Mercury - TR (APO)	ng/l	12	10000	910	1700	3400
Nickel - TR	ug/l	188034	22524	1711	2237	1100
Nitrate-N + Nitrite-N	mg/l	2681	11563	--	--	--
Oil & grease	mg/l	--	--	--	41	--
Phosphorus	mg/l	--	--	--	--	--
Selenium - TR	ug/l	52757	5737	127	--	--
Strontium	ug/l	--	--	671084	164164	81000
Sulfates	mg/l	40725	--	--	--	--
Sulfide	mg/l	--	--	--	--	--
TKN	mg/l	--	--	--	--	--
Zinc - TR	ug/l	2832280	2928226	3495	475	280

Note: "BPO" means Before Phase Out
Note: "APO" means After Phase Out

Table 6. Instream Conditions and Discharger Flow for Outfalls 001, 002, 003

Parameter	Units	Season	Value	Basis
Stream Flows				
1Q10	cfs	annual	6560	ORSANCO/US Army Corp Engineers
7Q10	cfs	annual	6560	ORSANCO/US Army Corp Engineers
		summer	0	
		winter	0	
30Q10	cfs	summer	0	
		winter	0	
Harmonic Mean	cfs	annual	24500	ORSANCO/US Army Corp Engineers
		Outfall 001/003		
Mixing Assumption	%	average	10	(***WLAs for non-carcinogens are developed using 100 percent of the 7Q10.)
	%	maximum	1	
		Outfall 002		
Mixing Assumption	%	average	25	
	%	maximum	25	
Hardness	mg/l	annual	120	ORSANCO/US Army Corp Engineers
pH	S.U.	summer	0	
		winter	0	
Temperature	C	summer	81	
		winter	0	
		Outfall 001		
Kraton Polymers flow	cfs	annual	19.6	PermitRAT - 95th percentile
		Outfall 002		
Kraton Polymers flow	cfs	annual	1.457	PermitRAT -95th Percentile
		Outfall 003		
Kraton Polymers flow	cfs	annual	1.45	PermitRAT - 95th Percentile
		001/003 Interactive		
Kraton Polymers flow	cfs	annual	21.07	PermitRAT -95th Percentile

Background Water Quality

Outfall 001			
Antimony	ug/l		No representative data available.
Chlorodibromomethane	ug/l		No representative data available.
Dichlorobromomethane	ug/l		No representative data available.
Manganese - TR	ug/l	240	ORSANCO; 2000-2007; n=49; 0<MDL; 95th Percentile - Willow Island
Titanium	ug/l	0.076	ORSANCO; 2000-2007; n=49; 0<MDL; 95th Percentile - Willow Island
Aluminum	ug/l	1250	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Ammonia-S	mg/l	0.18	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Arsenic - TR	ug/l	1.31	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Barium	ug/l	53	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Boron	ug/l		No representative data available.
Chlorides	mg/l		No representative data available.
Chloroform (Trichloromethane)	ug/l		No representative data available.
Chromium - TR	ug/l	2.28	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Copper - TR	ug/l	4.361	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Dissolved solids (ave)	mg/l	402	BWQR; ; n=26403; <MDL; 50th Percentile - Statewide
Iron - TR	ug/l	1943	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Lead - TR	ug/l	3.1	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Magnesium	mg/l	12.481	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Mercury - TR (BPO)	ng/l	10.2	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Mercury - TR (APO)	ng/l	10.2	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Nickel - TR	ug/l	8.014	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Nitrate-N + Nitrite-N	mg/l	1.42	ORSANCO; 2000-07; n=48; 0<MDL; Willow Island - 95th Percentile
Oil & grease	mg/l		No representative data available.
Phosphorus	mg/l	0.275	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Selenium - TR	ug/l	1.096	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Strontium	ug/l	120	Ecoregion; 2001-2003; n=67; 0<MDL; 50th Percentile - Statewide
Sulfates	mg/l	120	ORSANCO; 2000-07; n=48; 0<MDL; Willow Island - 95th Percentile
Sulfide	mg/l		No representative data available.
TKN	mg/l	1.83	ORSANCO; 2000-07; n=34; 0<MDL; Willow Island - 95th Percentile
Zinc - TR	ug/l	32.256	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Outfall 002			
Arsenic - TR	ug/l	1.31	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Chlorine (wwh) - TRes	mg/l	52	ORSANCO; 2000-07; n=48; 0<MDL; Willow Island - 95th Percentile
Copper - TR	ug/l	4.361	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Manganese - TR	ug/l	240	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Oil & grease	mg/l		No representative data available.

Selenium - TR	ug/l	1.096	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Zinc - TR	ug/l	32.256	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Aluminum	ug/l	1250	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Ammonia-S	mg/l	0.18	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Arsenic - TR	ug/l	1.31	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Barium	ug/l	53	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Boron	ug/l		No representative data available.
Chlorides	mg/l		No representative data available.
Chlorine (wwh,ewh, mwh,cwh) - TRes	mg/l		No representative data available.
Chloroform (Trichloromethane)	ug/l		No representative data available.
Chromium - TR	ug/l	2.28	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Copper - TR	ug/l	4.361	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Dissolved solids (ave)	mg/l	402	BWQR; ; n=26403; 0<MDL; 50th Percentile - Statewide
Iron - TR	ug/l	1943	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Lead - TR	ug/l	3.1	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Magnesium	mg/l	12.48	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Manganese - TR	ug/l		No representative data available.
Mercury - TR (BPO)	ng/l	10.2	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Mercury - TR (APO)	ng/l	10.2	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Nickel - TR	ug/l	8.014	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Nitrate-N + Nitrite-N	mg/l	1.42	ORSANCO; 2000-07; n=48; 0<MDL; Willow Island - 95th Percentile
Oil & grease	mg/l		No representative data available.
Phosphorus	mg/l	0.275	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Selenium - TR	ug/l	1.096	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Strontium	ug/l	120	Ecoregion; 2001-2003; n=67; 0<MDL; 50th Percentile - Statewide
Sulfates	mg/l	120	ORSANCO; 2000-07; n=48; 0<MDL; Willow Island - 95th Percentile
Sulfide	mg/l		No representative data available.
TKN	mg/l	1.83	ORSANCO; 2000-07; n=34; 0<MDL; Willow Island - 95th Percentile
Zinc - TR	ug/l	32.256	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Outfall 003			
Acenaphthene	ug/l		No representative data available.
Acenaphthylene	ug/l		No representative data available.
Acrylonitrile	ug/l		No representative data available.
Anthracene	ug/l		No representative data available.
Benzene	ug/l		No representative data available.
Benzo(a)anthracene	ug/l		No representative data available.
Benzo(a)pyrene	ug/l		No representative data available.
Benzo(k)fluoranthene	ug/l		No representative data available.

Bis(2-ethylhexyl)phthalate	ug/l		No representative data available.
Carbon tetrachloride	ug/l		No representative data available.
Chlorine (wwh) - TRes	mg/l	52	ORSANCO; 2000-2007; n=48; 0<MDL; 95th Percentile - Willow Island
Chlorobenzene	ug/l		No representative data available.
2-Chlorophenol	ug/l		No representative data available.
Chrysene	ug/l		No representative data available.
Di-n-butyl phthalate	ug/l		No representative data available.
1,2-Dichlorobenzene	ug/l		No representative data available.
1,3-Dichlorobenzene	ug/l		No representative data available.
1,4-Dichlorobenzene	ug/l		No representative data available.
1,1-Dichloroethane	ug/l		No representative data available.
1,2-Dichloroethane	ug/l		No representative data available.
1,1-Dichloroethylene	ug/l		No representative data available.
trans-1,2-Dichloroethylene	ug/l		No representative data available.
2,4-Dichlorophenol	ug/l		No representative data available.
1,2-Dichloropropane	ug/l		No representative data available.
Diethyl phthalate	ug/l		No representative data available.
Dimethyl phthalate	ug/l		No representative data available.
4,6-Dinitro-o-cresol	ug/l		No representative data available.
Dinitrophenols	ug/l		No representative data available.
2,4-Dinitrotoluene	ug/l		No representative data available.
2,6-Dinitrotoluene	ug/l		No representative data available.
Ethylbenzene	ug/l		No representative data available.
Ethylene dibromide (EDB)	ug/l		No representative data available.
Fluoranthene	ug/l		No representative data available.
Fluorene	ug/l		No representative data available.
Hexachlorobenzene (BPO)	ug/l		No representative data available.
Hexachlorobenzene (APO)	ug/l		No representative data available.
Hexachlorobutadiene (BPO)	ug/l		No representative data available.
Hexachlorobutadiene (APO)	ug/l		No representative data available.
Hexachloroethane	ug/l		No representative data available.
Methylene chloride (Dichloromethane)	ug/l		No representative data available.
Naphthalene	ug/l		No representative data available.
Nitrobenzene	ug/l		No representative data available.
2-Nitrophenol	ug/l		No representative data available.
Phenanthrene	ug/l		No representative data available.
Phenol (wwh)	ug/l	6	ORSANCO; 2000-2007; n=44; 0<MDL; 95th Percentile - Willow Island
Pyrene	ug/l		No representative data available.
Styrene	ug/l		No representative data available.

Tetrachloroethylene	ug/l		No representative data available.
Toluene	ug/l		No representative data available.
1,2,4-Trichlorobenzene	ug/l		No representative data available.
1,1,1-Trichloroethane	ug/l		No representative data available.
Trichloroethylene	ug/l		No representative data available.
Vinyl chloride	ug/l		No representative data available.
Aluminum	ug/l	1250	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Ammonia-S	mg/l	0.18	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Arsenic - TR	ug/l	1.31	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Barium	ug/l	53	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Boron	ug/l		No representative data available.
Chlorides	mg/l		No representative data available.
Chloroform (Trichloromethane)	ug/l		No representative data available.
Chromium - TR	ug/l	2.28	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Copper - TR	ug/l	4.361	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Dissolved solids (ave)	mg/l	402	BWQR; ; n=26403; 0<MDL; 50th Percentile - Statewide
Iron - TR	ug/l	1943	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Lead - TR	ug/l	3.1	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Magnesium	mg/l	12.481	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Mercury - TR (BPO)	ng/l	10.2	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Mercury - TR (APO)	ng/l	10.2	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Nickel - TR	ug/l	8.014	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Nitrate-N + Nitrite-N	mg/l	1.42	ORSANCO; 2000-07; n=48; 0<MDL; Willow Island - 95th Percentile
Oil & grease	mg/l		No representative data available.
Phosphorus	mg/l	0.275	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Selenium - TR	ug/l	1.096	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile
Strontium	ug/l	120	Ecoregion; 2001-2003; n=67; 0<MDL; 50th Percentile - Statewide
Sulfates	mg/l	120	ORSANCO; 2000-07; n=48; 0<MDL; Willow Island - 95th Percentile
Sulfide	mg/l		No representative data available.
TKN	mg/l	1.83	ORSANCO; 2000-07; n=34; 0<MDL; Willow Island - 95th Percentile
Zinc - TR	ug/l	32.256	ORSANCO; 2000-07; n=49; 0<MDL; Willow Island - 95th Percentile

Note: "BPO" means Before Phase Out
Note: "APO" means After Phase Out

Table 7a. Parameter Assessment – Outfall 001

Group1: Due to a lack of criteria, the following parameters could not be evaluated at this time.

Aluminum	*Manganese - TR*	*Magnesium*
Sulfide	*Titanium*	*TKN*
Phosphorus		

Group 2: PEQ < 25 percent of WQS or all data below minimum detection limit. WLA not required. No limit recommended; monitoring optional.

Boron	*Chloroform (Trichloromethane)*	*Strontium*
Chromium - TR		

Group 3: PEQ_{max} < 50 percent of maximum PEL and PEQ_{avg} < 50 percent of average PEL. No limit recommended; monitoring optional.

Arsenic – TR	*Chlorides*	*Dissolved solids (ave)*
Mercury – TR (BPO)	*Lead – TR*	*Nitrate-N + Nitrite-N*
Selenium – TR	*Zinc - TR*	*Barium*
Antimony	*Chlorodibromomethane*	*Iron –TR*
Nickel – TR	*Dichlorodibromomethane*	*Sulfates*

Group 4: PEQ_{max} >= 50 percent, but < 100 percent of the maximum PEL or PEQ_{avg} >= 50 percent, but < 100 percent of the average PEL. Monitoring is appropriate.

Copper - TR

Group 5: Maximum PEQ >= 100 percent of the maximum PEL or average PEQ >= 100 percent of the average PEL, or either the average or maximum PEQ is between 75 and 100 percent of the PEL and certain conditions that increase the risk to the environment are present. Limit recommended.

Limits to Protect Numeric Water Quality Criteria

Parameter	Units	Period	Recommended Effluent Limits Average	Maximum
Mercury – TR (APO)	*ng/L*		*12*	*1700*
Oil & Grease	*mg/L*		*--*	*41*

Table 7b. Parameter Assessment – Outfall 002

Group1: Due to a lack of criteria, the following parameters could not be evaluated at this time.

Manganese	*Chlorides*	*Sulfates*
Magnesium	*Phosphorus*	*Aluminum*
Sulfide	*TKN*	

Group 2: PEQ < 25 percent of WQS or all data below minimum detection limit. WLA not required. No limit recommended; monitoring optional.

Zinc – TR	*Boron*	*Nitrate-N + Nitrite-N*
Chromium – TR	*Chloroform (Trichloromethane)*	*Strontium*

Group 3: PEQ_{max} < 50 percent of maximum PEL and PEQ_{avg} < 50 percent of average PEL. No limit recommended; monitoring optional.

Arsenic – TR	*Dissolved Solids (ave)*	*Nickel - TR*
Iron – TR	*Mercury (BPO)*	*Oil & Grease*
Barium	*Lead - TR*	*Selenium - TR*

Group 4: PEQ_{max} >= 50 percent, but < 100 percent of the maximum PEL or PEQ_{avg} >= 50 percent, but < 100 percent of the average PEL. Monitoring is appropriate.

Copper - TR

Group 5: Maximum PEQ >= 100 percent of the maximum PEL or average PEQ >= 100 percent of the average PEL, or either the average or maximum PEQ is between 75 and 100 percent of the PEL and certain conditions that increase the risk to the environment are present. Limit recommended.

Limits to Protect Numeric Water Quality Criteria

			Recommended Effluent Limits	
Parameter	Units	Period	Average	Maximum
Chlorine (wwh,) – Tres	*mg/L*		*0.011*	*0.019*
Mercury – TR (APO)	*ng/L*		*12*	*1700*

Table 7c. Parameter Assessment – Outfall 003

Group1: Due to a lack of criteria, the following parameters could not be evaluated at this time.

Acenaphthylene	*1,1-Dichloroethane*	*Sulfide*
Aluminum	*Magnesium*	*Phosphorus*
Ethylene dibromide (EDB)	*TKN*	

Group 2: PEQ < 25 percent of WQS or all data below minimum detection limit. WLA not required. No limit recommended; monitoring optional.

Acenaphthene	*Acrylonitrile*	*Anthracene*
Benzene	*Benzo(a)anthracene*	*Benzo(a)pyrene*
Benzo(k)fluoranthene	*Carbon tetrachloride*	*Chlorobenzene*
2-Chlorophenol	*Chrysene*	*Di-n-butyl phthalate*
1,2-Dichlorobenzene	*1,3-Dichlorobenzene*	*1,4-Dichlorobenzene*
1,2-Dichloroethane	*1,1-Dichloroethylene*	*trans-1,2-Dichloroethylene*
2,4-Dichlorophenol	*1,2-Dichloropropane*	*Diethyl phthalate*
Dimethyl phthalate	*4,6-Dinitro-o-cresol*	*Dinitrophenols*
2,4-Dinitrotoluene	*2,6-Dinitrotoluene*	*Ethylbenzene*
Fluoranthene	*Fluorene*	*Hexachlorobenzene (BPO)*
Hexachlorobenzene (APO)	*Hexachlorobutadiene (BPO)*	*Hexachlorobutadiene (APO)*
Hexachloroethane	*Methylene chloride (Dichloromethane)*	*Naphthalene*
Nitrobenzene	*2-Nitrophenol*	*Phenanthrene*
Phenol (wwh)	*Pyrene*	*Styrene*
Tetrachloroethylene	*Toluene*	*1,2,4-Trichlorobenzene*
1,1,1-Trichloroethane	*1,1,2-Trichloroethane*	*Trichloroethylene*
Vinyl chloride	*Chloroform (Trichloromethane)*	*Mercury - TR (APO)*

Arsenic - TR	*Boron*	*Mercury - TR (BPO)*
Chromium - TR	*Iron - TR*	*Zinc - TR*
Strontium		

Group 3: PEQ_{max} < 50 percent of maximum PEL and PEQ_{avg} < 50 percent of average PEL. No limit recommended; monitoring optional.

Selenium - TR	*Bis(2-ethylhexyl)phthalate*	*Sulfates*
Barium	*Chlorides*	*Lead - TR*
Nickel - TR	*Nitrate-N + Nitrite-N*	*Oil & grease*

Group 4: PEQ_{max} >= 50 percent, but < 100 percent of the maximum PEL or PEQ_{avg} >= 50 percent, but < 100 percent of the average PEL. Monitoring is appropriate.

Dissolved solids (ave)

Group 5: Maximum PEQ >= 100 percent of the maximum PEL or average PEQ >= 100 percent of the average PEL, or either the average or maximum PEQ is between 75 and 100 percent of the PEL and certain conditions that increase the risk to the environment are present. Limit recommended.

Limits to Protect Numeric Water Quality Criteria

Parameter	Units	Period	Recommended Effluent Limits Average	Maximum
Chlorine (wwh) - TRes	*mg/l*		*0.011*	*0.019*
Copper - TR	*ug/l*		--	*33*

Table 8a. Final effluent limits and monitoring requirements for Kraton Polymers outfall 001and the basis for their recommendation.

Parameter	Units	Effluent Limits: Concentration 30 Day Average	Concentration Daily Maximum	Loading (kg/day) 30 Day Average	Loading (kg/day) Daily Maximum	Basis[b]
Flow	MGD	-----------------------------Monitor----------------------------				M[c], EP
Water Temperature	°F	-----------------------------Monitor----------------------------				M[c], EP
Thermal Discharge	10^6 BTU/hr		281.64			ABS/EP
Chemical Oxygen Demand	mg/L	-----------------------------Monitor----------------------------				M[c], EP
Copper	ug/L	-----------------------------Monitor----------------------------				WLA
Total Suspended Solids	mg/L		50[T]			ABS/EP
Oil & Grease	mg/L	15	20			BEJ/ABS/EP
pH	S.U.	-----------------------------6.0 to 9.0---------------------------				BEJ/ABS/EP
Mercury	ng/L	-----------------------------Monitor----------------------------				WLA
Whole Effluent Toxicity						
Acute	TU_a	-----------------------------Monitor----------------------------				BPJ
Chronic	TU_c	-----------------------------Monitor----------------------------				BPJ

See definitions below

Table 8b. Final effluent limits and monitoring requirements for Kraton Polymers outfall 002 and the basis for their recommendation.

		Effluent Limits				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis[b]
pH	S.U.	----------------------------6.0 to 9.0--------------------------				BEJ/ABS/EP
Total Suspended Solids	mg/L	30	100			BEJ/ABS/EP
Oil & Grease	mg/L	----------------------------Monitor---------------------------				M[c], EP
Arsenic – TR	ug/L	100	150	0.45	0.908	ABS/EP
Selenium -TR	ug/L	----------------------------Monitor---------------------------				M[c], EP
Zinc, TR	ug/L	----------------------------Monitor---------------------------				M[c], EP
Copper - TR	ug/L	----------------------------Monitor---------------------------				M[c], EP
Flow Rate	MGD	----------------------------Monitor---------------------------				M[c], EP
Chlorine –TR	mg/L	----------------------------Monitor---------------------------				M[c], EP
Copper – TR	ug/L	----------------------------Monitor---------------------------				WLA
Chlorine (wwh,) – Tres	mg/L	0.011	0.019	--	--	WLA
Mercury	ng/L	----------------------------Monitor---------------------------				WLA

See definitions below

Table 8c. Final effluent limits and monitoring requirements for Kraton Polymers outfall 003 and the basis for their recommendation.

		Effluent Limits				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis[b]
Biochemical Oxygen Demand	mg/L	24	64	72	191	M[c], EP
Chemical Oxygen Demand	mg/L	----------------------------Monitor---------------------------				M[c], EP
Total Suspended Solids	mg/L	40	130	120	389	M[c], EP
Oil & Grease, Hexane Extr Mtd	mg/L	15	20	45	60	BEJ/ABS/EP
Nitrogen, Ammonia (NH_3)	mg/L	----------------------------Monitor---------------------------				M[c], EP
Iron, TR	ug/L	----------------------------Monitor---------------------------				M[c], EP
Chromium, TR	ug/L	231	576	0.69	1.72	FEG-BAT
Nickel, TR	ug/L	351	827	1.04	2.47	FEG-BAT
Zinc, TR	ug/L	218	320	0.65	0.95	FEG-BAT
Lead, TR	ug/L	67	143	0.2	0.427	FEG-BAT
Copper, TR	ug/L	--	33	--	--	WLA
Carbon Tetrachloride	ug/L	18	38	0.054	0.114	FEG-BAT
Chloroform	ug/L	21	46	0.063	0.138	FEG-BAT
Toluene	ug/L	26	80	0.078	0.24	FEG-BAT
Benzene	ug/L	37	136	0.111	0.407	FEG-BAT
Acenaphthylene	ug/L	22	59	0.066	0.177	FEG-BAT
Acenaphthene	ug/L	22	49	0.066	0.177	FEG-BAT
Acrylonitrile	ug/L	96	242	0.287	0.724	FEG-BAT
Anthracene, General Organic	ug/L	--	0.46	--	0.00138	WLA/IMZM
3,4-BenzoFluoranthene	ug/L	23	61	0.069	0.182	FEG-BAT

Benzo(k)Fluoranthene	ug/L	22	59	0.066	0.177	FEG-BAT
Benzo-A-Pyrene	ug/L	23	61	0.069	0.182	FEG-BAT
Chlorobenzene	ug/L	15	28	0.045	0.084	FEG-BAT
Chloroethane	ug/L	104	268	0.311	0.802	FEG-BAT
Chrysene	ug/L	22	59	0.066	0.177	FEG-BAT
Diethyl phthalate	ug/L	81	203	0.242	0.607	FEG-BAT
Dimethyl phthalate	ug/L	19	47	0.057	0.141	FEG-BAT
Ethylbenzene	ug/L	32	108	0.096	0.323	FEG-BAT
Fluoranthene	ug/L	25	68	0.075	0.203	FEG-BAT
Fluorene	ug/L	22	59	0.066	0.177	FEG-BAT
Hexachloroethane	ug/L	21	54	0.045	0.084	FEG-BAT
Methyl Chloride	ug/L	86	190	0.257	0.568	FEG-BAT
Methylene Chloride	ug/L	40	89	0.120	0.266	FEG-BAT
Nitrobenzene	ug/L	27	68	0.081	0.203	FEG-BAT
Phenanthrene	ug/L	22	59	0.066	0.177	FEG-BAT
Pyrene	ug/L	25	67	0.075	0.200	FEG-BAT
Tetrachloroethylene	ug/L	22	56	0.066	0.168	FEG-BAT
1,1-Dichloroethane	ug/L	68	211	0.203	0.631	FEG-BAT
1,1-Dichloroethylene	ug/L	16	25	0.048	0.075	FEG-BAT
1,1,1-Trichloroethane	ug/L	21	54	0.063	0.162	FEG-BAT
1,1,2- Trichloroethane	ug/L	21	54	0.063	0.162	FEG-BAT
Benzo(A)Anthracene	ug/L	22	59	0.066	0.177	FEG-BAT
1,2-Dichloroethane	ug/L	22	59	0.066	0.177	FEG-BAT
1,2-Dichlorobenzene	ug/L	77	163	0.230	0.488	FEG-BAT
1,2-Dichloropropane	ug/L	153	230	0.458	0.688	FEG-BAT
1,2-trans-Dichloroethylene	ug/L	21	54	0.063	0.162	FEG-BAT
1,2,4-Trichlorobenzene	ug/L	68	140	0.203	0.419	FEG-BAT
1,3-Dichlorobenzene	ug/L	31	44	0.093	0.132	FEG-BAT
1,4-Dichlorobenzene	ug/L	15	28	0.045	0.084	FEG-BAT
2-Chlorophenol	ug/L	31	98	0.093	0.293	FEG-BAT
2-Nitrophenol	ug/L	41	69	0.123	0.206	FEG-BAT
2,4-Dichlorophenol	ug/L	39	112	0.117	0.335	FEG-BAT
2,4-Dimethylphenol	ug/L	18	36	0.054	0.108	FEG-BAT
2,4-Dinitrotoluene	ug/L	113	285	0.338	0.852	FEG-BAT
2,4-Dinitrophenol	ug/L	71	123	0.212	0.368	FEG-BAT
2,6-Dinitrotoluene	ug/L	255	641	0.763	1.917	FEG-BAT
4-Nitrophenol	ug/L	72	124	0.215	0.371	FEG-BAT
4,6-Dinitro-o-cresol	ug/L	78	277	0.233	0.829	FEG-BAT
Phenol	ug/L	15	26	0.045	0.078	FEG-BAT
Naphthalene	ug/L	22	59	0.066	0.177	FEG-BAT
Bis(2-ethylhexyl) Phthalate	ug/L	103	279	0.308	0.835	FEG-BAT
Di-N-Butylphthalate	ug/L	27	57	0.081	0.171	FEG-BAT
Vinyl Chloride	ug/L	104	268	0.311	0.802	FEG-BAT
Trichloroethylene	ug/L	21	54	0.063	0.162	FEG-BAT
Hexachlorobenzene	ug/L	15	28	0.045	0.084	FEG-BAT
Hexachlorobutadiene	ug/L	20	49	0.060	0.147	FEG-BAT
Flow Rate	MGD	----------------------------Monitor---------------------------				M[c], EP

Chlorine, TR	mg/L	0.011	0.019	--	--	WLA
Whole Effluent Toxicity						
Acute	TU_a			Monitor		BEJ
Chronic	TU_c			Monitor		BEJ
pH	S.U.			6.0 to 9.0		M[c], EP
Styrene	ug/L			Monitor		M[c], EP
1,3-Dichloropropylene	ug/L	--	24	--	0.072	WLA/IMZM
Ethylene Dibromide	ug/L			Monitor		M[c], EP
Total Dissolved Solids	mg/L			Monitor		WLA

[a] *Effluent loading based on average design discharge flow of 19.6 MGD – Outfall 001*
Effluent loading based on average design discharge flow of 1.457 MGD – Outfall 002
Effluent loading based on average design discharge flow of 1.45 MGD – Outfall 003

[b] Definitions:

ABS = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l));
BEJ= Best Engineering Judgment;
EP = Existing Permit;
FEG-BAT = Best Available Control Technology Currently Available, 40 CFR Part 414;
M = Monitoring;
WLA = Wasteload Allocation procedures (OAC 3745-2);
WLA/IMZM = Wasteload Allocation limited by Inside Mixing Zone Maximum;

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.
[d] 7 day average limit.
[T] Total non-filterable residue (TSS) net limits is based on Ohio River sediment that enters the plant.