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ENVIRONMENTAL ASSESSMENT OF PROPOSED EFFLUENT GUIDELINES FOR THE CENTRALIZED WASTE TREATMENT INDUSTRY

Volume I

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EXECUTIVE SUMMARY

The Environmental Assessment of the Proposed Effluent Guidelines for the Centralized Waste Treatment Industry quantifies water quality-related benefits for centralized waste treatment facilities based on site specific analyses of current conditions and the conditions that would be achieved by proposed BPT/BAT and pretreatment process changes.[1] Instream pollutant concentrations for priority and nonconventional pollutants from direct and indirect discharges are estimated separately for three subcategories (metals, oils and organics) of facility operations and in multiple subcategory combinations (as appropriate for individual facilities)[2] using stream dilution modeling. The benefits to aquatic life are projected by comparing the modeled instream pollutant concentrations to EPA aquatic life criteria or to toxic effect values; human health benefits are projected by comparing estimated instream pollutant concentrations to health-based water quality criteria. Potential inhibition of POTW operations and sewage sludge contamination (thereby, limiting its use for land application) are also evaluated based on current and proposed pretreatment levels. Inhibition of POTW operations is estimated by comparing modeled POTW influent concentrations to available inhibition levels; potential contamination of sewage sludge is estimated by comparing projected pollutant concentrations in sewage sludge to available EPA sewage sludge regulatory standards. Only the results for the combined subcategories analyses are presented here; results of the subcategory-specific analyses are presented in Section 4 of this report.

The water quality modeling results for 15 direct facilities (including combined subcategories as appropriate for individual facilities) discharging 113 pollutants to 15 receiving streams indicate that at current discharge levels, instream concentrations of 28 pollutants are

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[1]No evaluation of water quality benefits associated with achievement of BCT limitations was undertaken because the analysis centered on toxic pollutants (excluding conventional pollutants and pollutant parameters).

[2]Over 40 percent of the facilities in the Centralized Waste Treatment Industry have operations in multiple subcategories. Due to the presence of combined facilities, the overall impact cannot be properly assessed when reviewing subcategories separately.

projected to exceed chronic aquatic life criteria or toxic effect levels in 8 of the 15 (53 percent) receiving streams. Instream concentrations of 13 pollutants (using a target risk of 10^{-6} for carcinogens) are projected to exceed human health criteria (for water and organisms consumption) in 8 of the 15 (53 percent) receiving streams.

The proposed BPT/BAT alternative Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) are projected to reduce the aquatic life excursions to 5 of the 15 (33 percent) receiving streams for 23 and 22 pollutants for Regulatory Option 1 and Regulatory Option 2, respectively. Projected human health excursions are reduced to 12 pollutants at 4 of the 15 (27 percent) receiving streams for BPT/BAT Regulatory Option 1 and to 11 pollutants at 3 of the 15 (20 percent) receiving streams for BPT/BAT Regulatory Option 2. Pollutant loadings are reduced 32 percent at both options.

Modeling results for 45 indirect facilities (including combined subcategories as appropriate for individual facilities), which discharge to 33 POTWs on 33 receiving streams, indicate that at current discharge levels, instream concentrations of 10 pollutants are projected to exceed chronic aquatic life criteria or toxic effect levels in 16 of the 33 (48 percent) receiving streams. Instream concentrations of 4 pollutants (using a target risk of 10^{-6} for carcinogens) are projected to exceed human health criteria (for water and organisms consumption) in 17 of the 33 (52 percent) receiving streams. The proposed alternative regulatory pretreatment options would reduce the aquatic life and human health excursions to 1 pollutant at 2 of the 33 (6 percent) receiving streams for both Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1). Pollutant loadings are reduced 56 and 60 percent for Regulatory Option 1 and Regulatory Option 2, respectively. In addition, 1 pollutant is projected to contribute to potential POTW inhibition at 17 of the 35 (49 percent) POTWs receiving the discharge from indirect facilities. These potential POTW impacts are projected to be reduced to 1 pollutant at 6 of the 35 (17 percent) POTWs by the proposed alternative pretreatment regulatory options (Option 1 and Option 2). Contamination of sewage sludge is

projected to occur in 13 of the 35 (37 percent) POTWs and in 1 of the 35 (3 percent) POTWs at current and the proposed alternative pretreatment regulatory options (Option 1 and Option 2), respectively. Four (4) pollutants at current and 1 pollutant at the proposed regulatory options are projected to exceed EPA sewage sludge regulatory standards.

Documented environmental impacts on water quality and POTW operations from pollutant discharges from centralized waste treatment facilities are also summarized in the Environmental Assessment of Proposed Effluent Guidelines for the Centralized Waste Treatment Industry. The summary data are based on information obtained from State 304(l) Short Lists and EPA Regional and State Pretreatment Coordinators on the quality of receiving waters and impacts on POTW operations. Four (4) direct centralized waste treatment facilities and 8 POTWs, receiving wastewater from 13 centralized waste treatment facilities, are currently impairing receiving stream water quality (i.e., listed on State 304(l) short lists of impaired water bodies). In addition, 7 cases of impairments of POTW operations and 1 case of an impact on the quality of receiving waters have also been documented.

The effects of conventional pollutants and pollutant parameters are not calculated when modeling the effect of the proposed regulation on the water quality of receiving streams and POTW operations. The discharge of conventional pollutants such as total suspended solids (TSS), oil and grease, and 5-day biological oxygen demand (BOD_5) can have adverse effects on human health and the environment. For example, habitat degradation can result from increased suspended particulate matter that reduces light penetration and, thus, primary productivity, or from accumulation of sludge particles that alters benthic spawning grounds and feeding habitats. Oil and grease can have lethal effect on fish, by coating surface of gills causing asphyxia, by depleting oxygen levels due to excessive biological oxygen demand, or by reducing stream reaeration because of surface film. Oil and grease can also have detrimental effects on waterfowl by destroying the buoyancy and insulation of their feathers. Bioaccumulation of oil substances can cause human health problems including tainting of fish and bioaccumulation of carcinogenic polycyclic aromatic compounds. High BOD_5 levels can also deplete oxygen levels resulting in mortality or other adverse effects on fish.

1. INTRODUCTION

The purpose of this report is to present an assessment of the water quality benefits of controlling the discharge of priority and nonconventional pollutants from centralized waste treatment facilities to surface waters and publicly-owned treatment works (POTWs). Potential aquatic life and human health impacts of direct discharges on receiving stream water quality and of indirect discharges on POTWs and their receiving streams are projected at current, proposed BPT/BAT (Best Practicable Control Technology/Best Available Technology) and proposed PSES (Pretreatment Standards for Existing Sources) levels by quantifying pollutant releases and by using stream modeling techniques. In addition, EPA Regional and State Pretreatment Coordinators were contacted and State 304(l) Short Lists are reviewed for evidence of documented environmental impacts on aquatic life, human health, and POTW operations and for impacts on the quality of receiving water.

The report does not evaluate impacts associated with reduced releases of conventional pollutants and pollutant parameters because the analysis centered on toxic pollutants. However, the discharge of conventional pollutants such as total suspended solids (TSS), oil and grease, and 5-day biological oxygen demand (BOD_5) can have adverse effects on human health and the environment. For example, habitat degradation can result from increased suspended particulate matter that reduces light penetration and, thus, primary productivity, or from accumulation of sludge particles that alters benthic spawning grounds and feeding habitats. Oil and grease can have lethal effect on fish, by coating surface of gills causing asphyxia, by depleting oxygen levels due to excessive biological oxygen demand, or by reducing stream reaeration because of surface film. Oil and grease can also have detrimental effects on waterfowl by destroying the buoyancy and insulation of their feathers. Bioaccumulation of oil substances can cause human health problems including tainting of fish and bioaccumulation of carcinogenic polycyclic aromatic compounds. High BOD_5 levels can also deplete oxygen levels resulting in mortality or other adverse effects on fish.

Section 2 of this report describes the methodology used in the evaluation of projected water quality impacts and projected impacts on POTW operations for direct and indirect discharging facilities (including assumptions and caveats) and in the evaluation of documented environmental impacts. Section 3 describes the data sources used for evaluating water quality impacts such as plant-specific data, information used to evaluate POTW operations, water quality criteria and documented environmental impacts. A summary of the results of this analysis is presented in Section 4. Section 5 provides a complete list of references cited in this report. The various appendices presented in Volume II (Appendices A-G) provide additional detail on the specific information addressed in the main report. These appendices are available in the administrative record.

2. METHODOLOGY

2.1 Projected Water Quality Impacts

Potential water quality impacts of direct discharges on receiving streams and of indirect discharges on POTW operations and their receiving streams are evaluated using stream modeling techniques. Current and proposed pollutant releases are quantified. Site-specific and potential aquatic life and human health impacts resulting from current and proposed pollutant releases are evaluated separately for the three subcategories (metals, oils and organics) of facility operations and for multiple subcategory combinations as applicable to individual facilities.[3] Projected instream concentrations for each pollutant are compared to EPA water quality criteria or to toxic effect levels (i.e., lowest reported or estimated toxic concentration) for pollutants for which no water quality criteria have been developed. Inhibition of POTW operation and sludge contamination are also evaluated. The following two sections describe the methodology and assumptions used for evaluating the impact of direct and indirect discharging facilities.

2.1.1 Direct Discharging Facilities

Using a stream dilution model that does not account for fate processes, projected instream concentrations are calculated at current and proposed BPT/BAT treatment levels for stream segments with direct discharging facilities. For stream segments with multiple subcategory centralized waste treatment facilities, pollutant loadings for individual subcategories are summed before concentrations are calculated. The dilution model used for estimating instream concentrations is presented as Equation 1.

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[3]Over 40 percent of the facilities in the Centralized Waste Treatment Industry have operations in multiple subcategories. Due to the presence of combined facilities, the overall impact cannot be properly assessed when reviewing subcategories separately.

$$C_{is} = \frac{L/OD}{FF + SF} \times CF \qquad \text{(Eq. 1)}$$

where:

C_{is}	=	instream pollutant concentration (μg/L)
L	=	facility pollutant loading (lbs/year)
OD	=	facility operation (days/year)
FF	=	facility flow (million gal/day)
SF	=	receiving stream flow (million gal/day)
CF	=	conversion factors for units

The facility-specific data (i.e., pollutant loading, operating days, and facility flow) used in Eq. 1 are derived from the sources described in Section 3.1 of this report. Three receiving stream flow conditions (1Q10 low flow, 7Q10 low flow, and harmonic mean flow) are used for the current and proposed regulatory options. The 1Q10 and 7Q10 flows are the lowest 1-day or lowest consecutive 7-day average flow during any 10-year period and are used to estimate potential acute and chronic aquatic life impacts, respectively, as recommended in the *Technical Support Document for Water Quality-based Toxics Control* (U.S. EPA, 1991a). The harmonic mean flow is defined as the reciprocal of the mean value of the reciprocal of individual values and is used to estimate potential human health impacts. EPA recommends the long-term harmonic mean flow as the design flow for assessing potential human health impacts because it provides a more conservative estimate than the arithmetic mean flow. 7Q10 flows are also not appropriate for assessing potential human health impacts because they have no consistent relationship with the long-term mean dilution.

Because stream flows are not available for hydrologically complex waters such as bays, estuaries, and oceans, site-specific critical dilution factors (CDFs) or estuarine dissolved concentration potentials (DCPs), if CDFs are unavailable, are used to predict pollutant concentrations for facilities discharging to estuaries and bays as follows:

$$C_{es} = \left[\left(\frac{L/OD}{FF} \right) x\ CF \right] / \ CDF \qquad \text{(Eq. 2)}$$

where:

C_{es}	=	estuary pollutant concentration (μg/L)
L	=	facility pollutant loading (lbs/year)
OD	=	facility operation (days/year)
FF	=	facility flow (million gal/day)
CDF	=	critical dilution factor
CF	=	conversion factors for units

or

$$C_{es} = L\ x\ DCP\ x\ CF \qquad \text{(Eq. 3)}$$

where:

C_{es}	=	estuary pollutant concentration (μg/L)
L	=	facility pollutant loading (lbs/year)
DCP	=	dissolved concentration potential (mg/L)
CF	=	conversion factor for units

Site-specific critical dilution factors (CDFs) are obtained from a survey of States and Regions recently conducted by EPA's Office of Pollution Prevention and Toxics (OPPT) *(Mixing Zone Dilution Factors for New Chemical Exposure Assessments*, Draft Report, U.S. EPA, 1992). Dissolved concentration potentials (DCPs) are obtained from the Strategic Assessment Branch of the National Oceanic and Atmospheric Administration's (NOAA) Ocean Assessments Division. NOAA has developed DCPs based on freshwater inflow and salinity gradients to predict pollutant concentrations in each estuary in the National Estuarine Inventory (NEI) Data Atlas. These DCPs are applied to predict concentrations. They do not consider pollutant fate and are designed strictly to simulate concentrations of nonreactive dissolved substances. In addition, the DCPs reflect the predicted estuary-wide response and may not be indicative of site-specific locations.

Water quality criteria or toxic effect levels excursions are determined by dividing the projected freshwater instream (Eq. 1) or estuary (Eq. 2 or Eq. 3) pollutant concentrations by EPA water quality criteria or toxic effect levels. A value greater than 1.0 indicates an excursion.

2.1.2 Indirect Discharging Facilities

(a) Water Quality Impacts

A stream dilution model is used to project receiving stream impacts resulting from releases by indirect discharging facilities as shown in Eq. 4. For stream segments with multiple subcategory centralized waste treatment facilities, pollutant loadings for individual subcategories are summed before concentrations are calculated. The facility-specific data used in Eq. 4 are derived from sources described in Sections 3.1 and 3.2 of this report. Three receiving stream flow conditions (1Q10 low flow, 7Q10 low flow, and harmonic mean flow) are used for the current and proposed pretreatment options.

$$C_{is} = (L/OD) \times \frac{(1-TMT) \times CF}{PF + SF} \qquad \text{(Eq. 4)}$$

where:

C_{is}	=	instream pollutant concentration (μg/L)
L	=	facility pollutant loading (lbs/year)
OD	=	facility operation (days/year)
TMT	=	POTW treatment removal efficiency
PF	=	POTW flow (million gal/day)
SF	=	receiving stream flow (million gal/day)
CF	=	conversion factors for units

For POTWs located on bays and estuaries, pollutant concentrations are predicted using site-specific CDFs or NOAA's DCP values (Eq. 5 and Eq. 6).

$$C_{es} = \left[\left(\frac{L/OD \times (1-TMT)}{PF} \right) \times CF \right] / CDF \qquad \text{(Eq. 5)}$$

where:

C_{es}	=	estuary pollutant concentration (μg/L)
L	=	facility pollutant loading (lbs/year)
OD	=	facility operation (days/year)
TMT	=	POTW treatment removal efficiency
PF	=	POTW flow (million gal/day)
CDF	=	critical dilution factor
CF	=	conversion factors for units

or

$$C_{es} = L \times (1-TMT) \times DCP \times CF \qquad \text{(Eq. 6)}$$

where:

C_{es}	=	estuary pollutant concentration (μg/L)
L	=	facility pollutant loading (lbs/year)
TMT	=	POTW treatment removal efficiency
DCP	=	dissolved concentration potential (mg/L)
CF	=	conversion factors for units

Potential impacts on freshwater quality are determined by comparing projected instream pollutant concentrations (Eq. 4) at reported POTW flows and at 1Q10 low, 7Q10 low, and harmonic mean receiving stream flows with EPA water quality criteria or toxic effect levels for the protection of aquatic life and human health (see Section 2.1.1 for discussion on receiving stream flows). Projected estuary pollutant concentrations (Eq. 5 or Eq. 6), based on CDFs or DCPs, are also compared to EPA water quality criteria or toxic effect levels for the protection of aquatic life and human health to determine potential water quality impacts. Water quality criteria excursions are determined by dividing the projected instream or estuary pollutant concentration by the EPA water quality criteria or toxic effect levels. A value greater than 1.0 indicates an excursion.

(b) Impacts on POTW Operations

Impacts on POTW operations are calculated in terms of inhibition of POTW processes (i.e., inhibition of activated sludge or biological treatment) and contamination of POTW sewage sludges (thereby, limiting its use for land application). Inhibition of POTW operations is determined by comparing calculated POTW influent levels (Eq. 7) with available inhibition levels. Excursions are indicated by a value greater than 1.0.

$$C_{pi} = \frac{L/OD}{PF} \times CF \qquad \text{(Eq. 7)}$$

where:

C_{pi}	=	POTW influent concentration (μg/L)
L	=	facility pollutant loading (lbs/year)
OD	=	facility operation (days)
PF	=	POTW flow (million gal/day)
CF	=	conversion factors for units

Potential contamination of sewage sludge is evaluated by comparing projected pollutant concentrations in the sludge (Eq. 8) with EPA regulatory values for land application of sewage sludge. A value greater than 1.0 indicates an excursion.

$$C_{SP} = (L/OD) \times TMT \times PART \times SGF \times CF \qquad \text{(Eq. 8)}$$

where:

C_{sp}	=	sludge pollutant concentration (mg/kg)
L	=	facility pollutant loading (lbs/year)
OD	=	facility operation (days/year)
TMT	=	POTW treatment removal efficiency
PART	=	chemical-specific sludge partition factor
SGF	=	sludge generation factor (5.96 ppm)
CF	=	conversion factors for units.

Facility-specific data and information used to evaluate POTW operations are derived from the sources described in Sections 3.1 and 3.2. For centralized waste treatment facilities that discharge to the same POTW, their individual loadings are summed before the POTW influent and sludge concentrations are calculated.

2.1.3 Assumptions and Caveats

The following assumptions are used in this analysis:

- Background concentrations of each pollutant, both in the receiving stream and in the POTW influent, are equal to zero; therefore, only the impacts of discharging facilities are evaluated.

- All facilities were assumed to be in operation 250 days per year.

- An exposure duration of 365 days is used to determine the likelihood of actual excursions of human health criteria or toxic effect levels.

- Complete mixing of discharge flow and stream flow occurs across the stream at the discharge point. This mixing results in the calculation of an "average stream" concentration even though the actual concentration may vary across the width and depth of the stream.

- The process water at each facility and the water discharged to a POTW are obtained from a source other than the receiving stream.

- The pollutant load to the receiving stream is assumed to be continuous and is assumed to be representative of long-term facility operations. This assumption may overestimate risks to human health and aquatic life.

- 1Q10 and 7Q10 receiving stream flow rates are used to estimate aquatic life impacts, and harmonic mean flow rates are used to estimate human health impacts. 1Q10 low flows are estimated using the results of a regression analysis conducted by Versar for EPA's Office of Pollution Prevention and Toxics (OPPT) of 1Q10 and 7Q10 flows from representative U.S. rivers and streams (*Upgrade of Flow Statistics Used to Estimate Surface Water Chemical Concentrations for Aquatic and Human Exposure Assessment,* Versar, 1992). Harmonic mean flows are estimated from the mean and 7Q10 flows as recommended in the *Technical Support Document for Water-Quality-based Toxics Control* (U.S. EPA, 1991a).

These flows may not be the same as those used by specific states to assess impacts.

- Pollutant fate processes such as sediment adsorption, volatilization, and hydrolysis are not considered. This may result in estimated instream concentrations that are environmentally conservative (higher).

- Pollutants without a specific POTW treatment removal efficiency, provided by EPA or found in the literature, are assigned a removal efficiency of zero; pollutants without a specific partition factor are assigned a value of zero.

- Only the potential for metal contamination of sewage sludge to levels which would prohibit its land application as a fertilizer or soil conditioner is evaluated. There are sewage sludge regulatory values in the case of land-applied sludge for the following 10 pollutants - arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium and zinc.

- Water quality criteria or toxic effect levels developed for freshwater organisms are used in the analysis of facilities discharging to estuaries or bays.

- Facilities were only modeled if the receiving streams or the POTWs to which they discharge could be identified.

2.2 Documented Environmental Impacts

EPA Regional and State Pretreatment Coordinators were contacted and State 304(l) Short Lists are reviewed for evidence of documented environmental impacts on aquatic life, human health, POTW operations, and the quality of receiving water due to discharges of pollutants from centralized waste treatment facilities. Reported impacts are compiled and summarized by study site and facility.

3. DATA SOURCES

Readily available EPA and other agency databases, models and reports are used in the evaluation of water quality impacts. The following four sections describe the various data sources used in the analysis.

3.1 Facility-Specific Data

Projected centralized waste treatment facility effluent process flows, plant/pollutant operating days, and pollutant loadings (Appendix A) are obtained from the Engineering and Analysis Division (EAD) (December 1993). For each option, long-term averages were calculated for each pollutant of concern based on sampling data and self-monitoring data. Facilities reported in the 1991 Waste Treatment Industry Questionnaire the annual quantity discharged to surface waters and POTWs. The annual quantity discharged (facility flow) was multiplied by the long-term average for each pollutant and converted to the proper units to calculate the loading (pounds per year) for each pollutant.

The locations of centralized waste treatment facilities on receiving streams are identified using USGS cataloging and EPA stream segment (reach) numbers contained in EPA's Industrial Facilities Discharge (IFD) data base. Latitude/longitude coordinates, if available, are used to locate those facilities and POTWs that have not been assigned a reach number in IFD. The names, locations, and the flow data for the POTWs to which the indirect facilities discharge are obtained from the 1991 Waste Treatment Industry Questionnaire, EPA's 1992 NEEDS Survey, IFD, and EPA's Permit Compliance System (PCS).

The receiving stream flow data are obtained from either the W.E. Gates study data or from measured streamflow data, both of which are contained in EPA's GAGE file. The W.E. Gates study contains calculated average and low flow statistics based on the best available flow data and on drainage areas for reaches throughout the United States. The GAGE file also includes average and low flow statistics based on measured data from USGS gaging stations.

Dissolved Concentration Potentials (DCPs) for estuaries and bays are obtained from the Strategic Assessment Branch of NOAA's Ocean Assessments Division (Appendix B). Critical Dilution Factors are obtained from the *Mixing Zone Dilution Factors for New Chemical Exposure Assessments* (U.S. EPA, 1992).

3.2 Information Used to Evaluate POTW Operations

POTW treatment efficiency removals are obtained from the pass-through analysis completed for this project (U.S. EPA, 1994). Removals are developed from POTW removal data and an RREL (Risk Reduction Engineering Laboratory - Cincinnati) treatability database or by using the removal rate of a similar pollutant when data are not available (Appendix C). Use of the selected removals assumes that the evaluated POTWs are well-operated and have at least secondary treatment in place.

Inhibition values are obtained from *Guidance Manual for Preventing Interference at POTWs* (U.S. EPA, 1987) and from *CERCLA Site Discharges to POTWs: Guidance Manual* (U.S. EPA, 1990) (Appendix C). The most conservative values for activated sludge are used. For pollutants with no specific inhibition value, a value based on compound type (e.g., aromatics) is used.

Sewage sludge regulatory levels, if available for the pollutants of concern, are obtained from the 40 CFR Part 503, Standards for the Use or Disposal of Sewage Sludge, Final Rules (February 19, 1993). Pollutant limits established for the final use or disposal of sewage sludge when the sewage sludge is applied to agricultural and non-agricultural land are used (Appendix C).[4] Sludge partition factors are obtained from the *Report to Congress on the Discharge of Hazardous Wastes to Publicly-Owned Treatment Works (Domestic Sewage Study)* (U.S. EPA, 1986). The partition factor is a measure of the tendency for the pollutant to

[4]The standard used for molybdenum is 35 mg/kg (59 Federal Register 9095, February 18, 1994).

partition in sludge when it is removed from wastewater. For predicting sludge generation, the model assumes that 1,400 pounds of sludge are generated for each million gallons of wastewater processed (Metcalf & Eddy, 1972). This results in a sludge generation factor of 5.96 (that is, for every 1 ppb of pollutant removed from wastewater and partitioned to sludge, the concentration in sludge is 5.96 ppm dry weight).

3.3 Water Quality Criteria (WQC)

The ambient criteria (or toxic effect levels) for the protection of aquatic life and human health are obtained from a variety of sources including EPA criteria documents, EPA's Assessment Tools for the Evaluation of Risk (ASTER), and EPA's Integrated Risk Information System (IRIS) (Appendix C). Ecological toxicity estimations are used when published values are not available. The hierarchies used to select the appropriate aquatic life and human health values are described in the following sections.

3.3.1 Aquatic Life

Water quality criteria for many pollutants have been established by EPA for the protection of freshwater aquatic life (acute and chronic criteria). The acute value represents a maximum allowable 1-hour average concentration of a pollutant at any time and can be related to acute toxic effects on aquatic life. The chronic value represents the average allowable concentration of a toxic pollutant over a 4-day period at which a diverse genera of aquatic organisms and their uses should not be unacceptably affected, provided that these levels are not exceeded more than once every 3 years.

For pollutants for which no water quality criteria have been developed, specific toxicity values (acute and chronic effect concentrations reported in published literature or estimated using various application techniques) are used. In selecting values from the literature, measured concentrations from flow-through studies under typical pH and temperature conditions are preferred. The test organism must be a North American resident species of fish or invertebrate.

The hierarchies used to select the appropriate acute and chronic values are listed below in descending order of priority.

Acute Aquatic Life Values:

- National acute freshwater quality criteria;
- Lowest reported acute test values (96-hour LC_{50} for fish and 48-hour EC_{50}/LC_{50} for daphnids);
- Lowest reported LC_{50} test value of shorter duration, adjusted to estimate a 96-hour exposure period;
- Lowest reported LC_{50} test value of longer duration, up to a maximum of two weeks exposure; and
- Estimated 96-hour LC_{50} from the ASTER QSAR model.

Chronic Aquatic Life Values:

- National chronic freshwater quality criteria;
- Lowest reported maximum allowable toxic concentration (MATC), lowest observable effect concentration (LOEC), or no observable effect concentration (NOEC);
- Lowest reported chronic growth or reproductive toxicity test concentration;
- Estimated chronic toxicity concentration from a measured acute chronic ratio for a less sensitive species, quantitative structure activity relationship (QSAR) model, or default acute:chronic ratio of 10:1.

3.3.2 Human Health

Water quality criteria for the protection of human health are established in terms of a pollutant's toxic effects, including carcinogenic potential. These human health criteria values are developed for two exposure routes: (1) ingesting the pollutant via contaminated aquatic

organisms only, and (2) ingesting the pollutant via both contaminated water and aquatic organisms as follows:

For Toxicity Protection (ingestion of organisms only)

$$HH_{oo} = \frac{RfD \times CF}{IR_f \times BCF} \qquad \text{(Eq. 18)}$$

where:

HH_{oo} = human health value (μg/L)
RfD = reference dose (mg/day)
IR_f = fish ingestion rate (0.0065 kg/day)
BCF = bioconcentration factor (liters/kg)
CF = conversion factor for units (1,000 μg/mg)

For Carcinogenicity Protection (ingestion of organisms only)

$$HH_{oo} = \frac{BW \times RL \times CF}{SF \times IR_f \times BCF} \qquad \text{(Eq. 19)}$$

where:

HH_{oo} = human health value (μg/L)
BW = body weight (70 kg)
RL = risk level (10^{-6})
SF = cancer slope factor $(mg/kg/day)^{-1}$
IR_f = fish ingestion rate (0.0065 kg/day)
BCF = bioconcentration factor (liters/kg)
CF = conversion factor for units (1,000 μg/mg)

For Toxicity Protection (ingestion of water and organisms)

$$HH_{wo} = \frac{RfD \times CF}{IR_w + (IR_f \times BCF)} \qquad \text{(Eq. 20)}$$

where:

HH_{wo}	=	human health value (μg/L)
RfD	=	reference dose (mg/day)
IR_w	=	water ingestion rate (2 liters/day)
IR_f	=	fish ingestion rate (0.0065 kg/day)
BCF	=	bioconcentration factor (liters/kg)
CF	=	conversion factor for units (1000 μg/mg)

For Carcinogenicity Protection (ingestion of water and organisms)

$$HH_{wo} = \frac{BW \times RL \times CF}{SF \times [\ IR_w + (IR_f \times BCF)\ ]} \qquad \text{(Eq. 21)}$$

where:

HH_{wo}	=	human health value (μg/L)
BW	=	body weight (70 kg)
RL	=	risk level (10^{-6})
SF	=	cancer slope factor $(mg/kg/day)^{-1}$
IR_w	=	water ingestion rate (2 liters/day)
IR_f	=	fish ingestion rate (0.0065 kg/day)
BCF	=	bioconcentration factor (liters/kg)
CF	=	conversion factor for units (1,000 μg/mg)

The values for ingesting specific pollutants by contaminated water and/or contaminated aquatic organisms are derived by assuming an average daily ingestion of 2 liters of water, an average daily fish consumption rate of 6.5 grams of fish products, and an average adult body weight of

70 kilograms (*Technical Support Document for Water Quality-Based Toxics Controls* (U.S. EPA, 1991).

Values protective of carcinogenicity are used to assess the potential effects on human health, if EPA has established a cancer slope factor. Protective concentration levels for carcinogens are developed in terms of non-threshold lifetime risk level. Criteria at a risk level of 10^{-6} are chosen for this analysis. This risk level indicates a probability of one additional case of cancer for every 1,000,000 persons exposed. Toxic effects criteria for noncarcinogens include systemic effects (e.g., reproductive, immunological, neurological, circulatory, or respiratory toxicity), organ-specific toxicity, developmental toxicity, mutagenesis, and lethality.

The hierarchy used to select the most appropriate human health criteria values is listed below in descending order of priority:

- Calculated human health criteria values using EPA's Integrated Risk Information System (IRIS) reference doses (RfDs) or cancer slope factors (SFs) used in conjunction with adjusted 3 percent lipid BCF values derived from *Ambient Water Quality Criteria Documents* (U.S. EPA, 1980); three percent is the mean lipid content of fish tissue reported in the study from which the average daily fish consumption rate of 6.5g/day was derived;

- Calculated human health criteria values using current IRIS RfDs or SFs and representative BCF values for common North American species of fish or invertebrates or estimated BCF values;

- Calculated human health criteria values using RfDs or SFs from EPA's Health Effects Assessment Summary Tables (HEAST) used in conjunction with adjusted 3 percent lipid BCF values derived from *Ambient Water Quality Criteria Documents* (U.S. EPA, 1980);

- Calculated human health criteria values using current RfDs or SFs from HEAST and representative BCF values for common North American species of fish or invertebrates or estimated BCF values;

- Criteria from the *Ambient Water Quality Criteria Documents* (U.S. EPA, 1980); and

- Calculated human health values using RfDs or SFs from data sources other than IRIS or HEAST.

This hierarchy is based on Section 2.4.6 of the *Technical Support Document for Water Quality-based Toxics Control* (U.S. EPA, 1991a), which recommends using the most current risk information from IRIS when estimating human health risks. In cases where chemicals have both RfDs and cancer SFs from the same level of the hierarchy, human health values are calculated using the formulas for carcinogenicity, which always results in the more stringent value of the two given the risk levels employed.

3.4 Documented Environmental Impacts

Data are obtained from EPA Regional and State Pretreatment Coordinators in Regions I, II, III and V. Data are also obtained from the 1990 State 304(l) Short Lists (U.S. EPA, 1991b).

4. SUMMARY OF RESULTS

4.1 Projected Water Quality Impacts

The results of this analysis show the potential water quality benefits of controlling discharges from centralized waste treatment facilities to surface waters and POTWs. The following two sections summarize potential aquatic life and human health impacts on receiving stream water quality and on POTW operations and their receiving streams for the metals, oils, and organics subcategories and for multiple subcategory combinations (as applicable for individual facilities) at current discharges and at the proposed regulatory options (Table 1). Section 4.1.1 presents the results for direct discharges; section 4.1.2 presents the results for indirect discharges. Appendices D, E and F present the results of the stream modeling for each type of discharge.

4.1.1 Direct Discharges

(a) Metals Subcategory

The effects of direct wastewater discharges on receiving stream water quality are evaluated at current and proposed BPT/BAT (Metals Option 3) treatment levels for 11 facilities discharging 80 pollutants (Table 2) to 11 receiving streams (8 rivers and 3 estuaries).

These 11 facilities currently discharge 88.4 million pounds-per-year of priority and nonconventional pollutants (Table 3). These loadings are reduced to 40.2 million pounds-per-year at proposed BPT/BAT levels; a reduction of 55 percent.

Modeled instream concentrations of 2 pollutants are projected to exceed human health criteria (for water and organisms consumption) in 5 of the 11 receiving streams at current discharge levels (Tables 4 and 5). No excursions are projected at proposed BPT/BAT discharge levels.

Additionally, instream concentrations of 13 pollutants are projected to exceed chronic aquatic life criteria or toxic effect levels in 5 of the 11 receiving streams at current discharge levels (Tables 4 and 5). Proposed BPT/BAT discharge levels reduce projected excursions to 2 pollutants in 2 of the 11 receiving streams.

Tables 4 and 5 also provide information on projected instream pollutant excursions of human health criteria (for organisms consumption only) and of acute aquatic life criteria or toxic effect levels. Instream pollutant concentrations are projected to exceed human health criteria at current discharge levels only and acute aquatic life criteria at both current and proposed BPT/BAT discharge levels.

(b) Oils Subcategory

The effects of direct wastewater discharges on receiving stream water quality are evaluated at current and at the two co-proposed BPT/BAT (Oils Option 2 and Oils Option 3) treatment levels for 4 facilities discharging 50 pollutants (Table 6) to 4 receiving streams (3 rivers and 1 estuary).

These 4 facilities currently discharge 3.1 million pounds-per-year of priority and nonconventional pollutants (Table 7). These loadings are reduced to 1.0 million pounds-per-year at proposed BPT/BAT Oils Option 2 levels and to 0.12 million pounds-per-year at proposed BPT/BAT Oils Option 3; reductions of 68 and 96 percent, respectively.

Modeled instream pollutant concentrations are projected to exceed human health criteria (for water and organisms consumption) in 1 of the 4 receiving streams at both current and proposed BPT/BAT Oils Option 2 discharge levels for 3 pollutants and 1 pollutant, respectively (Tables 8 and 9). No excursions of human health criteria are projected at proposed BPT/BAT Oils Option 3 discharge levels.

Additionally, instream concentrations of 12 pollutants are projected to exceed chronic aquatic life criteria in 2 of the 4 receiving streams at current discharge levels (Tables 8 and 9). Proposed BPT/BAT Oils Option 2 and Oils Option 3 discharge levels reduce projected excursions to 1 of the 4 receiving streams for 4 pollutants and 1 pollutant, respectively.

Tables 8 and 9 also provide information on projected instream pollutant excursions of human health criteria (for organisms consumption only) and of acute aquatic life criteria or toxic effect levels. Instream pollutant concentrations are projected to exceed human health and acute aquatic life criteria at current discharge levels only.

(c) Organics Subcategory

The effects of direct wastewater discharges on receiving stream water quality are evaluated at current and proposed BPT/BAT (Organics Option 1) treatment levels for 5 facilities discharging 82 pollutants (Table 10) to 5 receiving streams (4 rivers and 1 estuary).

These 5 facilities currently discharge 87.0 million pounds-per- year of priority and nonconventional pollutants (Table 11). These loadings are reduced to 80.5 million pounds-per-year at proposed BPT/BAT levels; a reduction of 8 percent.

Modeled instream concentrations of 11 pollutants are projected to exceed human health criteria (for water and organisms consumption) in 3 of the 5 receiving streams at both current and proposed BPT/BAT discharge levels (Tables 12 and 13).

Additionally, modeled instream pollutant concentrations are projected to exceed chronic aquatic life criteria or toxic effect levels in 2 of the 5 receiving streams at both current and proposed BPT/BAT discharge levels (Table 12). A total of 23 pollutants at current and 22 pollutants at proposed BPT/BAT are projected to exceed instream criteria or toxic effect levels (Table 13).

Tables 12 and 13 also provide information on projected instream pollutant excursions of human health criteria (for organisms consumption only) and of acute aquatic life criteria or toxic effect levels. Instream pollutant concentrations are projected to exceed human health and acute aquatic life criteria at both current and proposed BPT/BAT discharge levels.

(d) Multiple Subcategory Combinations

In order to evaluate overall impacts of current direct wastewater discharges on receiving stream water quality and potential benefits of the proposed BPT/BAT regulatory options, water quality analyses are performed, in addition to the subcategory - specific analyses described above, for multiple subcategory combinations as appropriate for individual facilities[5]. These analyses are performed for 15 facilities discharging a total of 113 pollutants (Table 14) to 15 receiving streams (12 rivers and 3 estuaries) at current discharge levels and at the proposed BPT/BAT Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) (See Table 1 for description of options).

These 15 facilities currently discharge 179 million pounds-per- year of priority and nonconventional pollutants (Table 15). These loadings are reduced to 122 million pounds-per-year at proposed BPT/BAT Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1), and to 121 million pounds-per-year at proposed BPT/BAT Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3 and Organics Option 1), for reductions of approximately 32 percent.

Modeled instream concentrations of 13 pollutants are projected to exceed human health criteria (for water and organisms consumption) in 8 of the 15 receiving streams (53 percent) at current discharge level (Tables 16 and 17). The proposed BPT/BAT Regulatory Option 1 (the

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[5] Over 40 percent of the direct facilities in the Centralized Waste Treatment Industry have operations in multiple subcategories.

combination of Metals Option 3, Oils Option 2, and Organics Option 1) is projected to reduce these excursions to 12 pollutants at 4 receiving streams and proposed BPT/BAT Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) to 11 pollutants at 3 receiving streams (27 and 20 percent of the receiving streams, respectively).

Additionally, modeled instream pollutant concentrations are projected to exceed chronic aquatic life criteria or toxic effect levels in 8 of the 15 (53 percent) receiving streams at current discharge levels and in 5 of the 15 (33 percent) receiving streams at both proposed BPT/BAT regulatory options (Table 16). A total of 28 pollutants at current, 23 pollutants at proposed BPT/BAT Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1), and 22 pollutants at proposed BPT/BAT Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) are projected to exceed instream criteria or toxic effect levels (Table 17).

Tables 16 and 17 also provide information on projected instream pollutant excursions of human health criteria (for organisms consumption only) and of acute aquatic life criteria or toxic effect levels. Instream pollutant concentrations are projected to exceed human health and acute aquatic life criteria at both current and proposed BPT/BAT regulatory options.

4.1.2 Indirect Discharges

(a) Metals Subcategory

The potential effects of 36 indirect facilities, which discharge 80 pollutants (Table 18) to 28 POTWs on 28 receiving streams (24 rivers and 4 estuaries), on receiving stream water quality are evaluated at current and proposed pretreatment (Metals Option 3) discharge levels.

These 36 facilities currently discharge 36.9 million pounds-per-year of priority and nonconventional pollutants (Table 3). These loadings are reduced to 16.5 million pounds-per-year after proposed pretreatment; a reduction of 55 percent.

Modeled instream concentrations of 1 pollutant are projected to exceed human health criteria (for water and organisms consumption) in 7 of the 28 receiving streams at current discharge levels (Tables 19 and 20). No excursions are projected at proposed pretreatment discharge levels.

Additionally, modeled instream concentrations of 9 pollutants are projected to exceed chronic aquatic life criteria or toxic effect levels in 14 of the 28 receiving streams at current discharge levels (Tables 19 and 20). The proposed pretreatment reduces projected excursions to 1 pollutant in 2 of the 28 receiving streams.

Tables 19 and 20 also provide information on projected instream pollutant excursions of human health criteria (for organisms consumption only) and of acute aquatic life criteria or toxic effect levels. No excursions of human health criteria are projected at current or proposed pretreatment discharge levels. Instream pollutant concentrations are projected to exceed acute aquatic life criteria at current discharge levels only.

In addition, the potential impacts of 38 indirect facilities, which discharge to 30 POTWs, are evaluated in terms of inhibition of POTW operations and contamination of sludge.[6] At current discharge levels, inhibition problems are projected to occur from 1 pollutant at 9 of 30 POTWs (Tables 21 and 22). Potential inhibition problems are reduced after proposed pretreatment to 1 pollutant at 2 of the 30 POTWs. Contamination of sludge is projected to occur in 11 of the 30 POTWs from 3 pollutants at current discharge levels (Tables 21 and 22). Potential sludge contamination is reduced after proposed pretreatment to 1 pollutant at 1 of the 30 POTWs.

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[6]The two additional facilities, analyzed for potential impacts on POTW operations, discharge to two POTWs whose receiving streams/flows could not be identified; therefore, they are not included in the water quality analysis.

(b) Oils Subcategory

The potential effects of 24 indirect facilities, which discharge 50 pollutants (Table 23) to 18 POTWs on 18 receiving streams (16 rivers and 2 estuaries), on receiving stream water quality are evaluated at current and at the co-proposed pretreatment (Oils Option 2 and Oils Option 3) discharge levels.

These 24 facilities currently discharge 6.8 million pounds-per-year of priority and nonconventional pollutants (Table 7). These loadings are reduced to 2.2 million pounds-per-year after proposed pretreatment Oils Option 2 and to 0.25 million pounds-per-year after proposed pretreatment Oils Option 3; a reduction of 68 and 96 percent, respectively.

Modeled instream concentrations of 1 pollutant are projected to exceed human health criteria (for water and organisms consumption) in 1 of the 18 receiving streams at current discharge levels. (Tables 24 and 25). No excursions are projected at either co-proposed pretreatment discharge levels.

Additionally, instream concentrations of 4 pollutants are projected to exceed chronic aquatic life criteria or toxic effect levels in 5 of the 18 receiving streams at current discharge levels (Tables 24 and 25). No excursions are projected at either co-proposed pretreatment discharge levels.

Tables 24 and 25 also provide information on projected instream pollutant excursions of human health criteria (for consumption only) and of acute aquatic life criteria or toxic effect levels. No excursions are projected at current or either co-proposed pretreatment discharge levels.

In addition, the potential impacts of 25 facilities, which discharge to 19 POTWs, are evaluated in terms of inhibition of POTW operation and contamination of sludge.[7] At current discharge levels, inhibition problems are projected to occur at 11 of the 19 POTWs from 1 pollutant (Tables 26 and 27). These inhibition problems are reduced after both co-proposed pretreatment options to 3 of the 19 POTWs and 1 pollutant. Potential contamination of sludge is projected to occur in 1 of the 19 POTWs from 2 pollutants at current discharge levels (Tables 26 and 27). No contamination of sludge is projected at proposed pretreatment Oils Option 2 or Oils Option 3 discharge levels.

(c) Organics Subcategory

The potential effects of 15 indirect facilities, which discharge 84 pollutants (Table 28) to 15 POTWs on 15 receiving streams (12 rivers and 3 estuaries), on receiving stream water quality are evaluated at current and proposed pretreatment (Organics Option 1) discharge levels.

These 15 facilities currently discharge 11.4 million pounds-per-year of priority and nonconventional pollutants (Table 11). These loadings are reduced to 5.4 million pounds-per-year after proposed pretreatment; a reduction of 52 percent.

Modeled instream concentrations of 3 pollutants are projected to exceed human health criteria (for water and organisms consumption) in 11 of the 15 receiving streams at current discharge levels (Tables 29 and 30). The proposed pretreatment will reduce projected excursions to 1 pollutant at 2 of the 15 receiving streams. None of the evaluated pollutants are projected to exceed chronic aquatic life criteria or toxic effect levels at current or proposed pretreatment discharge levels (Tables 29 and 30).

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[7]The one additional facility, analyzed for impacts on POTW operations discharges to a POTW whose receiving stream/flow could not be identified; therefore, it is not included in the water quality analysis.

Tables 29 and 30 also provide information on projected instream pollutant excursions of human health criteria (for consumption only) and of acute aquatic life criteria or toxic effect levels. Excursions of human health criteria are projected at current discharge levels only. No excursions of acute aquatic life criteria are projected.

In addition, the potential impacts of 15 facilities, which discharge to 15 POTWs, are evaluated in terms of inhibition of POTW operations and contamination of sludge at **current** and proposed pretreatment discharge levels. No potential inhibition problems or sludge contamination problems are projected at any discharge level (Table 31).

(d) Multiple Subcategory Combinations

In order to evaluate overall impacts of current indirect wastewater discharges on POTW operations and receiving stream water quality and potential benefits of the proposed pretreatment options, POTW and water quality analyses are performed, in addition to the subcategory-specific analyses described above, for multiple subcategory combinations as appropriate for individual facilities.[8] These analyses are performed for 45 facilities discharging a total of 113 pollutants (Table 32) to 33 POTWs on 33 receiving streams (29 rivers and 4 estuaries) at current discharge levels and at the proposed pretreatment Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) (See Table 1 for description of options).

These 45 facilities currently discharge 55.1 million pounds-per-year of priority and nonconventional pollutants (Table 15). These loadings are reduced to 24.1 million pounds-per-year after proposed pretreatment Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and to 22.1 million pounds-per-year after proposed

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[8] Over 40 percent of the indirect facilities in the Centralized Waste Treatment Industry have operations in multiple subcategories.

pretreatment Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1); a reduction of 56 and 60 percent, respectively.

Modeled instream concentrations of 4 pollutants are projected to exceed human health criteria (for water and organisms consumption) in 17 of the 33 receiving streams (52 percent) at current discharge levels (Tables 33 and 34). Proposed pretreatment Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) are both projected to reduce these excursions to 1 pollutant at 2 of the 33 receiving streams (6 percent).

Additionally, modeled instream pollutant concentrations are projected to exceed chronic aquatic life criteria or toxic effect levels in 16 of the 33 (48 percent) and in 2 of the 33 (6 percent) receiving streams at current and at the proposed pretreatment Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) discharge levels, respectively (Table 33). A total of 10 pollutants at current and 1 pollutant at proposed pretreatment Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) are projected to exceed pollutant criteria or toxic effect levels (Table 34).

Tables 33 and 34 also provide information on projected instream pollutant excursions of human health criteria (for organisms consumption only) and of acute aquatic life criteria or toxic effects. Excursions are projected at current discharge levels only.

In addition, the potential impacts of 47 indirect facilities, which discharge to 35 POTWs, are evaluated in terms of inhibition of POTW operations and contamination of sludge.[9] At current discharge levels, inhibition problems from 1 pollutant are projected to occur at 17 of the 35 POTWs (49 percent) (Tables 35 and 36). After proposed pretreatment Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) inhibition problems are reduced to 1 pollutant at 6 of the 35 POTWs (17 percent). Potential contamination of sludge is projected from 4 pollutants at 13 of the 35 (37 percent) POTWs and from 1 pollutant at 1 of the 35 (3 percent) POTWs at current and at the proposed pretreatment Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1) and Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1) discharge levels, respectively (Tables 35 and 36).

4.2 Documented Environmental Impacts

EPA Region and State Pretreatment Coordinators identified environmental impacts on POTW operations and water quality due to discharges of pollutants from 8 indirect centralized waste treatment facilities (Table 36). Impacts included 7 cases of impairment to POTW operations due to cyanide, nitrate/nitrite, sodium, zinc and ammonia, and 1 case of an impact on the quality of receiving waters due to organics. In addition, 4 direct centralized waste treatment facilities and 8 POTWs, which receive the discharge from 13 facilities, are identified by States as being point sources causing water quality problems and are included on their 304(l) Short List (Tables 37 and 38). Pollutants of concern include cadmium, copper, cyanide, lead, mercury, nickel, selenium, silver, zinc, and organics. Section 304(l) of the Water Quality Act of 1987 requires States to identify waterbodies impaired by the presence of toxic substances, to identify point source discharges of these toxics, and to develop Individual Control Strategies

[9]The two additional facilities analyzed for potential POTW impacts discharge to two POTWs whose receiving streams/flows could not be identified; therefore, they are not included in the water quality analysis.

(ICSs) for these discharges. The Short List is a list of waters for which a State does not expect applicable water quality standards (numeric or narrative) to be achieved after technology-based requirements have been met due entirely or substantially to point source discharges of Section 307(a) toxics. Documentation received from the pretreatment coordinators are provided in the CBI record.

Table 1. Centralized Waste Treatment Industry Subcategories and Analyzed Treatment Levels

Subcategory	Analyzed Treatment Levels	
		Proposed BPT/BAT/PSES
1. Subcategory - Specific Analyses		
Metals	Current	Option 3
Oils	Current	Option 2, Option 3
Organics	Current	Option 1
2. Multiple Subcategory Combinations*		
Regulatory Option 1	Current	Metals - Option 3, Oils - Option 2, Organics - Option 1
Regulatory Option 2	Current	Metals - Option 3, Oils - Option 3, Organics - Option 1

* As appropriate for individual facilities.

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Table 2. Metals Subcategory - Pollutants Discharged From 11 Direct Centralized Waste Treatment Facilities

Pollutant Name	Number of Detections by Facility
ACETOPHENONE	8
ALUMINUM	10
AMENABLE CYANIDE	10
AMMONIA AS N	11
ANTIMONY	10
ARSENIC	10
BARIUM	10
BENZOIC ACID	10
BENZYL ALCOHOL	10
BIPHENYL	9
BIS(2-ETHYLHEXYL)PHTHALATE	7
BORON	10
CADMIUM	10
CALCIUM	11
CARBON DISULFIDE	7
CHROMIUM	10
COBALT	10
COPPER	10
CYANIDE	11
DIPHENYL ETHER	10
ETHYL BENZENE	7
FLUORIDE	10
HEX CHROMIUM	10
HEXANOIC ACID	10
IODINE	9
IRIDIUM	9
IRON	10
LEAD	10
LITHIUM	9
LUTETIUM	9
MAGNESIUM	10
MANGANESE	10
MERCURY	6
METHYLENE CHLORIDE	7
MOLYBDENUM	10
N-DECANE	10
N-DODECANE	10
N-EICOSANE	10
N-HEXADECANE	10
N-OCTADECANE	10
N-TETRADECANE	10
N,N-DIMETHYLFORMAMIDE	10
NAPHTHALENE	10
NICKEL	10
NITRATE-NITRITE AS N	11
O+P XYLENE	7
PHENOL	10
PHOSPHORUS	9
POTASSIUM	10

Table 2. Metals Subcategory - Pollutants Discharged From 11 Direct Centralized Waste Treatment Facilities (Continued)

Pollutant Name	Number of Detections by Facility
RHENIUM	9
SELENIUM	10
SILICON	9
SILVER	10
SODIUM	11
STRONTIUM	9
STYRENE	10
SULFIDE	10
SULFUR	10
TANTALUM	9
TELLURIUM	9
TETRACHLOROETHENE	7
THALLIUM	10
TIN	10
TITANIUM	10
TOLUENE	10
TOTAL PHENOLS	10
TOTAL PHOSPHORUS	11
TUNGSTEN	9
URANIUM	9
VANADIUM	10
ZINC	10
1,1-DICHLOROETHANE	7
1,1-DICHLOROETHENE	10
1,1,1-TRICHLOROETHANE	10
1,4-DIOXANE	10
2-BUTANONE	10
2-METHYLNAPTHALENE	10
2-PROPANONE	10
4-CHLORO 3-METHYLPHENOL	10
4-METHYL 2-PENTANONE	10

Source: Engineering and Analysis Division (EAD), December 1993.

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Table 3. Summary of Pollutant Loadings for Metals Subcategory of Direct and Indirect Centralized Waste Treatment Facilities

	Loadings, pounds-per-year*		
	Direct Dischargers	Indirect Dischargers	Total
Current	88,414,098	36,893,258	125,307,356
Proposed BPT/BAT/Pretreatment	40,174,630	16,472,387	56,647,017
No. of Pollutants Evaluated	80	80	**80
No. of Facilities Evaluated	11	36	47

* Loadings are representative of priority and non-conventional pollutants evaluated; conventional pollutants such as BOD, COD, TSS, TOC and Oil and Grease are not included.

** The same pollutant may be discharged from a number of direct and indirect facilities; therefore, the total does not equal the sum of pollutants.

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Subcategory: Metals / Direct Dischargers
Number of Facilities: **11**
Number of Receiving Streams: **11**
Number of Pollutants Discharged: **80**

Table 4. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Current					
Streams (No.)	4	5	5	3	5
Pollutants (No.)	3 (1.1 - 41.0)	13 (1.0 - 145)	2 (1.3 - 70.6)	1 (1.7 - 8.6)	15
Carcinogens (No.)**	NA	NA	2 (1.3 - 70.6)	NA	2
Total Excursions	**8**	**36**	**6**	**3**	
Proposed Option					
Streams (No.)	2	2	0	0	2
Pollutants (No.)	1 (1.2 - 1.3)	2 (2.1 - 4.7)	0	0	2
Carcinogens (No.)**	NA	NA	0	NA	0
Total Excursions	**2**	**4**	**0**	**0**	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
NA = Not Applicable.

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Subcategory: Metals / Direct Dischargers
Number of Facilities: **11**
Number of Receiving Streams: **11**
Number of Pollutants Discharged: **80**

Table 5. Summary of Pollutants Projected to Exceed Criteria for Centralized Waste Treatment Discharges

	Acute Aquatic Life		Chronic Aquatic Life		Human Health Water and Organisms		Human Health Organisms Only	
	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option
Arsenic*					5 (1.3-70.6)		3 (1.7-8.6)	
Boron			3 (1.9-12.4)	2 (2.1-2.2)				
Cadmium			2 (2.6-2.8)					
Copper			2 (1.0-1.1)					
Cyanide	4 (2.5-41.0)	2 (1.2-1.3)	5 (2.2-145)	2 (4.4-4.7)				
Hex Chromium	2 (1.2-1.3)		2 (1.5-1.6)					
Lead			2 (1.1-1.2)					
Mercury			3 (3.4-23.5)					
Molybdenum			2 (4.1-4.4)					
N-Decane			3 (1.1-7.2)					
Potassium			2 (1.4)					
Silver	2 (1.1-1.2)		4 (2.0-33.0)					
Tin			3 (2.0-12.9)					
Vanadium			3 (1.6-10.4)					
1,1-Dichloroethene*					1 (2.0)			
TOTAL	8	2	36	4	6	0	3	0

NOTE: Numbers in parentheses represent magnitude of excursions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection ($R = 10^{-6}$).

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Table 6. Oils Subcategory - Pollutants Discharged From 4 Direct Centralized Waste Treatment Facilities

Pollutant Name	Number of Detections by Facility
ALUMINUM	4
AMMONIA AS N	4
ANTIMONY	4
ARSENIC	4
BARIUM	4
BENZENE	4
BENZOIC ACID	4
BORON	4
CADMIUM	4
CALCIUM	4
CHROMIUM	4
COBALT	4
COPPER	4
ETHYL BENZENE	4
FLUORIDE	4
HEXANOIC ACID	4
IRON	4
LEAD	4
M-XYLENE	4
MAGNESIUM	4
MANGANESE	4
METHYLENE CHLORIDE	4
MOLYBDENUM	4
N-DECANE	4
N-DOCOSANE	4
N-DODECANE	4
N-EICOSANE	4
N-HEXACOSANE	4
N-HEXADECANE	4
N-OCTADECANE	4
N-TETRADECANE	4
NICKEL	4
NITRATE-NITRITE AS N	4
O+P XYLENE	4
PHENOL	4
SILVER	4
SODIUM	4
SULFIDE, TOTAL	4
TETRACHLOROETHENE	4
TIN	4
TITANIUM	4
TOLUENE	4
TOTAL PHENOLS	4
TOTAL PHOSPHORUS	4
TRIPROPYLENEGLYCOLMETHYL ETHER	4
ZINC	4
1,1,1-TRICHLOROETHANE	4
2-BUTANONE	4
2-PROPANONE	4
4-CHLORO 3-METHYLPHENOL	4

Source: Engineering and Analysis Division (EAD), December 1993. 12/5/94

Table 7. Summary of Pollutant Loadings for Oils Subcategory of Direct and Indirect Centralized Waste Treatment Facilities

	Loadings, pounds-per-year*		
	Direct Dischargers	Indirect Dischargers	Total
Current	3,137,428	6,821,072	9,958,500
Proposed BPT/BAT/Pretreatment (Oils Option 2)	1,007,375	2,192,019	3,199,394
Proposed BPT/BAT/Pretreatment (Oils Option 3)	116,856	254,227	371,083
No. of Pollutants Evaluated	50	50	**50
No. of Facilities Evaluated	4	24	28

* Loadings are representative of priority and non-conventional pollutants evaluated; conventional pollutants such as BOD, COD, TSS, TOC, and Oil and Grease are not included.

** The same pollutant may be discharged from a number of direct and indirect facilities; therefore, the total does not equal the sum of pollutants.

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Subcategory: Oils / Direct Dischargers
Number of Facilities: **4**
Number of Receiving Streams: **4**
Number of Pollutants Discharged: **50**

Table 8. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Current					
Streams (No.)	1	2	1	1	2
Pollutants (No.)	4 (1.2 - 10.5)	12 (1.1 - 187)	3 (1.8 - 12.0)	1 (1.4)	15
Carcinogens (No.)**	NA	NA	3 (1.8 - 12.0)	NA	3
Total Excursions	**4**	**15**	**3**	**1**	
Proposed Oils Option 2					
Streams (No.)	0				
Pollutants (No.)	0	1	1	0	1
Carcinogens (No.)**	NA	4 (1.3 - 13.8)	1 (3.4)	0	5
Total Excursions	**0**	NA	1 (3.4)	NA	1
		4	**1**	**0**	
Proposed Oils Option 3					
Streams (No.)	0	1	0	0	1
Pollutants (No.)	0	1 (11.7)	0	0	1
Carcinogens (No.)**	NA	NA	0	NA	0
Total Excursions	**0**	**1**	**0**	**0**	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
NA = Not Applicable.

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Subcategory: Oils / Direct Dischargers
Number of Facilities: **4**
Number of Receiving Streams: **4**
Number of Pollutants Discharged: **50**

Table 9. Summary of Pollutants Projected to Exceed Criteria for Centralized Waste Treatment Discharges

	Acute Aquatic Life			Chronic Aquatic Life			Human Health Water and Organisms			Human Health Organisms Only		
	Current	Proposed Oils Option 2	Proposed Oils Option 3	Current	Proposed Oils Option 2	Proposed Oils Option 3	Current	Proposed Oils Option 2	Proposed Oils Option 3	Current	Proposed Oils Option 2	Proposed Oils Option 3
Aluminum				1 (5.7)								
Arsenic*							1 (12.0)			1 (1.4)		
Benzene*							1 (4.9)	1 (3.4)				
Boron				2 (1.1-77.1)	1 (13.8)	1 (11.7)						
Cadmium				1 (2.7)	1 (2.7)							
Copper	1 (10.5)			1 (13.5)								
Iron				1 (2.4)								
Lead	1 (1.2)			1 (25.7)	1 (2.8)							
Molybdenum				1 (1.2)								
N-Decane				2 (2.6-187)								
Nickel				1 (1.7)	1 (1.3)							
Silver	1 (3.4)			2 (1.3-98.0)								
Tetrachloroethene*							1 (1.8)					
Tin				1 (1.1)								
Zinc	1 (4.2)			1 (3.9)								
TOTAL	4	0	0	15	4	1	3	1	0	1	0	0

NOTE: Numbers in parentheses represent magnitude of excursions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection ($R = 10^{-6}$).

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Table 10. Organics Subcategory - Pollutants Discharged From 5 Direct Centralized Waste Treatment Facilities

Pollutant Name	Number of Detections by Facility
ACETOPHENONE	4
ALUMINUM	5
AMENABLE CYANIDE	5
AMMONIA AS N	5
ANTIMONY	4
ARSENIC	4
BARIUM	5
BENZENE	4
BENZOIC ACID	4
BENZYL ALCOHOL	4
BORON	5
BROMODICHLOROMETHANE	4
CALCIUM	5
CARBON DISULFIDE	4
CHLOROBENZENE	4
CHLOROFORM	4
CHROMIUM	4
COBALT	4
COPPER	4
CYANIDE	5
DIETHYL ETHER	4
ETHYL BENZENE	4
FLUORIDE	5
HEXANOIC ACID	4
IODINE	5
IRON	5
ISOPHORONE	4
LEAD	4
LITHIUM	5
M-XYLENE	4
MAGNESIUM	5
MANGANESE	4
MERCURY	4
METHYLENE CHLORIDE	5
MOLYBDENUM	4
N,N-DIMETHYLFORMAMIDE	4
NAPHTHALENE	4
NICKEL	5
NITRATE-NITRITE AS N	4
O+P XYLENE	4
O-CRESOL	4
P-CRESOL	4
PENTACHLOROPHENOL	5
PHENOL	4
PHOSPHORUS	5
POTASSIUM	5
PYRIDINE	4
SILICON	5
SODIUM	5
STRONTIUM	5
SULFIDE	5
SULFUR	5
TETRACHLOROETHENE	4
TETRACHLOROMETHANE	4
TIN	5
TITANIUM	4

Table 10. Organics Subcategory - Pollutants Discharged From 5 Direct Centralized Waste Treatment Facilities
(continued)

Pollutant Name	Number of Detections by Facility
TOLUENE	4
TRANS-1,2-DICHLOROETHENE	4
TRICHLOROETHENE	5
TRICHLOROFLUOROMETHANE	4
VINYL CHLORIDE	4
ZINC	4
1,1-DICHLOROETHANE	4
1,1-DICHLOROETHENE	4
1,1,1-TRICHLOROETHANE	4
1,1,1,2-TETRACHLOROETHANE	4
1,1,2-TRICHLOROETHANE	4
1,2-DIBROMOETHANE	4
1,2-DICHLOROBENZENE	4
1,2-DICHLOROETHANE	4
1,2,3-TRICHLOROPROPANE	4
2-BUTANONE	5
2-CHLOROPHENOL	4
2-HEXANONE	4
2-PICOLINE	4
2-PROPANONE	5
2,3-DICHLOROANILINE	4
2,3,4,6-TETRACHLOROPHENOL	5
2,4-DIMETHYLPHENOL	4
2,4,5-TRICHLOROPHENOL	4
2,4,6-TRICHLOROPHENOL	5
4-METHYL 2-PENTANONE	4

Source: Engineering and Analysis Division (EAD), December 1993.

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Table 11. Summary of Pollutant Loadings for Organics Subcategory of Direct and Indirect Centralized Waste Treatment Facilities

	Loadings, pounds-per-year*		
	Direct Dischargers	Indirect Dischargers	Total
Current	87,025,839	11,371,557	98,397,396
Proposed BPT/BAT/Pretreatment	80,532,999	5,408,752	85,941,751
No. of Pollutants Evaluated	82	84	**84
No. of Facilities Evaluated	5	15	20

* Loadings are representative of priority and non-conventional pollutants evaluated; conventional pollutants such as BOD, COD, TSS, TOC, and Oil and Grease are not included.

** The same pollutant may be discharged from a number of direct and indirect facilities; therefore, the total does not equal the sum of pollutants.

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Subcategory: Organics / Direct Dischargers
Number of Facilities: **5**
Number of Receiving Streams: **5**
Number of Pollutants Discharged: **82**

Table 12. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Current					
Streams (No.)	1	2	3	1	3
Pollutants (No.)	12 (1.3 - 59.5)	23 (1.2 - 1645)	11 (1.2 - 107)	4 (3.2 - 10.2)	30
Carcinogens (No.)**	NA	NA	10 (1.2 - 107)	NA	10
Total Excursions	**12**	**26**	**14**	**4**	
Proposed Option					
Streams (No.)	1	2	3	1	3
Pollutants (No.)	9 (1.3 - 59.5)	22 (1.5 - 1645)	11 (1.2 - 107)	4 (3.2 - 10.2)	29
Carcinogens (No.)**	NA	NA	10 (1.2 - 107)	NA	10
Total Excursions	**9**	**24**	**14**	**4**	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
NA = Not Applicable.

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Subcategory: Organics / Direct Dischargers
Number of Facilities: 5
Number of Receiving Streams: 5
Number of Pollutants Discharged: 82

Table 13. SUMMARY OF POLLUTANTS PROJECTED TO EXCEED CRITERIA FOR CENTRALIZED WASTE TREATMENT DISCHARGES

	Acute Aquatic Life		Chronic Aquatic Life		Human Health Water and Organisms		Human Health Organisms Only	
	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option
Aluminum			1 (5.7)	1 (2.5)				
Antimony	1 (1.9)		1 (5.3)	1 (2.0)				
Arsenic*					2 (4.6 - 84.1)	2 (4.0 - 84.1)	1 (10.2)	1 (10.2)
Boron			1 (82.4)	1 (70.6)				
Carbon Disulfide			1 (29.6)	1 (29.6)				
Chloroform*					1 (1.3)	1 (1.3)		
Cobalt			1 (4.0)	1 (2.4)				
Copper	1 (13.6)	1 (6.8)	1 (19.7)	1 (9.9)				
Cyanide	1 (59.5)	1 (59.5)	2 (1.7 - 243)	2 (1.7 - 243)				
Iron			1 (2.0)	1 (1.5)				
Lead			1 (18.5)	1 (12.3)				
Lithium			1 (23.5)	1 (14.6)				
Magnesium			1 (2.4)	1 (2.4)				
Mercury	1 (8.5)	1 (8.5)	2 (8.4 - 1645)	2 (8.4 - 1645)	1 (3.4)	1 (3.4)	1 (3.2)	1 (3.2)
Methylene Chloride*					1 (3.2)	1 (3.2)		
Molybdenum			1 (13.5)	1 (6.4)				
Nickel	1 (1.8)		1 (15.5)	1 (8.4)				
Pentachlorophenol*	1 (58.6)	1 (58.6)	1 (95.6)	1 (95.6)	2 (5.2 - 107)	2 (5.2 - 107)	1 (3.7)	1 (3.7)
Potassium	1 (17.2)	1 (13.7)	2 (1.2 - 166)	1 (132)				
Sodium	1 (2.1)	1 (2.1)	1 (3.3)	1 (3.3)				
Tetrachloroethene*					1 (9.5)	1 (9.5)		
Tin			1 (38.2)	1 (30.8)				
Trichloroethene*			1 (5.1)	1 (5.1)	1 (4.6)	1 (4.6)		
Zinc	1 (1.4)		1 (1.4)					
1,1,2-Trichloroethane*					1 (4.8)	1 (4.8)		
1,2-Dibromoethane*					2 (1.4 - 21.4)	2 (1.4 - 21.4)		
1,2-Dichloroethane*					1 (1.2)	1 (1.2)		
2,3,4,6-Tetrachlorophenol	1 (2.6)	1 (2.6)	1 (29.3)	1 (29.3)				
2,4,5-Trichlorophenol	1 (2.9)	1 (2.9)	1 (4.4)	1 (4.4)				
2,4,6-Trichlorophenol*	1 (1.3)	1 (1.3)	1 (16.0)	1 (16.0)	1 (7.7)	1 (7.7)	1 (3.9)	1 (3.9)
TOTAL	12	9	26	24	14	14	4	4

NOTE: Numbers in parentheses represent magnitude of excursions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection ($R = 10^{-6}$).

Table 14. Multiple Subcategory Combinations - Pollutants Discharged From 15 Direct Centralized Waste Treatment Facilities

Pollutant Name	Number of Detections by Stream
ACETOPHENONE	9
ALUMINUM	14
AMENABLE CYANIDE	12
AMMONIA AS N	15
ANITMONY	14
ARSENIC	14
BARIUM	14
BENZENE	5
BENZOIC ACID	14
BENZYL ALCOHOL	11
BIPHENYL	9
BIS(2-ETHYLHEXYL)PHTHALATE	7
BORON	15
BROMODICHLOROMETHANE	2
CADMIUM	12
CALCIUM	15
CARBON DISULFIDE	9
CHLOROBENZENE	2
CHLOROFORM	3
CHROMIUM	14
COBALT	14
COPPER	14
CYANIDE	13
DIETHYL ETHER	3
DIPHENYL ETHER	10
ETHYL BENZENE	10
FLUORIDE	14
HEXCHROMIUM	10
HEXANOIC ACID	14
IODINE	12
IRIDIUM	9
IRON	14
ISOPHORONE	2
LEAD	14
LITHIUM	12
LUTETIUM	9
M-XYLENE	5
MAGNESIUM	15
MANGANESE	14
MERCURY	8
METHYLENE CHLORIDE	11
MOLYBDENUM	14
N,N-DIMETHYLFORMAMIDE	12
N-DECANE	12
N-DOCOSANE	3
N-DODECANE	12
N-EICOSANE	12
N-HEXACOSANE	3
N-HEXADECANE	12
N-OCTADECANE	12
N-TETRADECANE	12
NAPHTHALENE	11
NICKEL	15
NITRATE-NITRITE AS N	14
O+P XYLENE	10

Table 14. Multiple Subcategory Combinations - Pollutants Discharged From 15 Direct Centralized Waste Treatment Facilities (continued

Pollutant Name	Number of Detections by Stream
O-CRESOL	3
P-CRESOL	3
PENTACHLOROPHENOL	3
PHENOL	14
PHOSPHORUS	12
POTASSIUM	13
PYRIDINE	3
RHENIUM	9
SELENIUM	10
SILICON	11
SILVER	12
SODIUM	15
STRONTIUM	12
STYRENE	10
SULFIDE	14
SULFUR	13
TANTALUM	9
TELLURIUM	9
TETRACHLOROETHENE	11
TETRACHLOROMETHANE	2
THALLIUM	10
TIN	14
TITANIUM	14
TOLUENE	13
TOTAL PHENOLS	12
TOTAL PHOSPHORUS	12
TRANS-1,2-DICHLOROETHENE	3
TRICHLOROETHENE	3
TRICHLOROFLUOROMETHANE	3
TRIPROPYLENEGLYCOL METHYL ETHER	3
TUNGSTEN	9
URANIUM	9
VANADIUM	10
VINYL CHLORIDE	3
ZINC	14
1,1-DICHLOROETHANE	9
1,1-DICHLOROETHENE	11
1,1,1-TRICHLOROETHANE	14
1,1,1,2-TETRACHLOROETHANE	2
1,1,2-TRICHLOROETHANE	3
1,2-DIBROMOETHANE	2
1,2-DICHLOROBENZENE	2
1,2-DICHLOROETHANE	3
1,2,3-TRICHLOROPROPANE	2
1,4-DIOXANE	10
2-BUTANONE	14
2-CHLOROPHENOL	3
2-HEXANONE	3
2-METHYLNAPHTHALENE	10
2-PICOLINE	3
2-PROPANONE	14
2,3-DICHLOROANILINE	3
2,3,4,6-TETRACHLOROPHENOL	4
2,4-DIMETHYLPHENOL	2
2,4,5-TRICHLOROPHENOL	3
2,4,6-TRICHLOROPHENOL	3
4-CHLORO 3-METHYLPHENOL	12
4-METHYL 2-PENTANONE	12

Source: Engineering and Analysis Division (EAD), December 1993.

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Table 15. Summary of Pollutant Loadings For Multiple Subcategory Combinations of Direct and Indirect Centralized Waste Treatment Facilities

	Loadings, pounds-per-year*		
	Direct Dischargers	Indirect Dischargers	Total
Current	178,577,365	55,085,887	233,663,252
Proposed Regulatory Option 1 (the combination of Metals Option 3, Oils Option 2, and Organics Option 1)	121,715,004	24,073,158	145,788,162
Proposed Regulatory Option 2 (the combination of Metals Option 3, Oils Option 3, and Organics Option 1)	120,824,485	22,135,366	142,959,851
No. of Pollutants Evaluated	113	113	**113
No. of Facilities Evaluated	15	45	60

* Loadings are representative of priority and non-conventional pollutants evaluated; conventional pollutants such as BOD, COD, TSS, TOC and Oil and Grease are not included.

** The same pollutant may be discharged from a number of direct and indirect facilities; therefore, the total does not equal the sum of pollutants.

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Subcategory: Combined / Direct Dischargers
Number of Facilities: **15**
Number of Receiving Streams: **15**
Number of Pollutants Discharged: **113**

Table 16. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Current					
Streams (No.)	6	8	8	5	8
Pollutants (No.)	15 (1.1 - 59.5)	28 (1.0 - 1645)	13 (1.2 - 107)	4 (1.4 - 10.2)	37
Carcinogens (No.)**	NA	NA	12 (1.2 - 107)	NA	12
Total Excursions	**24**	**77**	**23**	**8**	
Regulatory Option 1[a]					
Streams (No.)	3	5	4	1	6
Pollutants (No.)	9 (1.2 - 59.5)	23 (1.3 - 1645)	12 (1.2 - 107)	4 (3.2 - 10.2)	31
Carcinogens (No.)**	NA	NA	11 (1.2 - 107)	NA	11
Total Excursions	**11**	**32**	**15**	**4**	
Regulatory Option 2[b]					
Streams (No.)	3	5	3	1	6
Pollutants (No.)	9 (1.2 - 59.5)	22 (1.5 - 1645)	11 (1.2 - 107)	4 (3.2 - 10.2)	29
Carcinogens (No.)**	NA	NA	10 (1.2 - 107)	NA	10
Total Excursions	**11**	**29**	**14**	**4**	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
[a] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 2, and Organics Option 1.
[b] Regulatory Option 2 = The combination of Metals Option 3, Oils Option 3, and Organics Option 1.
NA = Not Applicable.

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Subcategory: Combined / Direct Dischargers
Number of Facilities: 15
Number of Receiving Streams: 15
Number of Pollutants Discharged: 113

Table 17. Summary of Pollutants Projected to Exceed Criteria for Centralized Waste Treatment Discharges

	Acute Aquatic Life			Chronic Aquatic Life			Human Health Water and Organisms			Human Health Organisms Only		
	Current	Regulatory Option 1[a]	Regulatory Option 2[b]	Current	Regulatory Option 1[a]	Regulatory Option 2[b]	Current	Regulatory Option 1[a]	Regulatory Option 2[b]	Current	Regulatory Option 1[a]	Regulatory Option 2[b]
Aluminum				2 (5.7)	1 (2.5)	1 (2.5)						
Antimony	1 (1.9)			1 (5.3)	1 (2.0)	1 (2.0)						
Arsenic*							8 (1.7-84.1)	2 (4.0-84.1)	2 (4.0-84.1)	5 (1.4-10.2)	1 (10.2)	1 (10.2)
Benzene*							1 (4.9)	1 (3.4)				
Boron				6 (1.3-82.4)	4 (2.1-70.6)	4 (2.1 - 70.6)						
Cadmium				3 (2.6-2.8)	1 (2.7)							
Carbon Disulfide				1 (29.6)	1 (29.6)	1 (29.6)						
Chloroform*							1 (1.3)	1 (1.3)	1 (1.3)			
Cobalt				1 (4.0)	1 (2.4)	1 (2.4)						
Copper	2 (10.5-13.6)	1 (6.8)	1 (6.8)	4 (1.0-19.7)	1 (9.9)	1 (9.9)						
Cyanide	5 (2.5-59.5)	3 (1.2-59.5)	3 (1.2 - 59.5)	7 (1.7-243)	4 (1.7-243)	4 (1.7-243)						
Hex Chromium	2 (1.3)			2 (1.5-1.6)								
Iron				2 (2.0-2.4)	1 (1.5)	1 (1.5)						
Lead	1 (1.2)			4 (1.1-25.7)	2 (2.8-12.3)	1 (12.3)						
Lithium				1 (23.5)	1 (14.6)	1 (14.6)						
Magnesium				1 (2.4)	1 (2.4)	1 (2.4)						
Mercury	1 (8.5)	1 (8.5)	1 (8.5)	5 (3.8-1645)	2 (8.4-1645)	2 (8.4 - 1645)	1 (3.4)	1 (3.4)	1 (3.4)	1 (3.2)	1 (3.2)	1 (3.2)
Methylene Chloride*							1 (3.2)	1 (3.2)	1 (3.2)			
Molybdenum				4 (1.2-13.5)	1 (6.4)	1 (6.4)						
N-Decane				5 (1.1-187)								
Nickel	1 (1.8)			2 (1.7-15.5)	2 (1.3-8.4)	1 (8.4)						
Pentachlorophenol*	1 (58.6)	1 (58.6)	1 (58.6)	1 (95.6)	1 (95.6)	1 (95.6)	2 (5.2-107)	2 (5.2-107)	2 (5.2-107)	1 (3.7)	1 (3.7)	1 (3.7)
Potassium	1 (17.2)	1 (13.7)	1 (13.7)	4 (1.2-166)	1 (132)	1 (132)						
Silver	3 (1.1-3.4)			6 (1.8-98.0)								
Sodium	1 (2.1)	1 (2.1)	1 (2.1)	1 (3.3)	1 (3.3)	1 (3.3)						
Tetrachloroethene*							2 (1.8-9.5)	1 (9.5)	1 (9.5)			
Tin				5 (1.1-38.2)	1 (30.8)	1 (30.8)						
Trichloroethene*				1 (5.1)	1 (5.1)	1 (5.1)	1 (4.6)	1 (4.6)	1 (4.6)			
Vanadium				3 (1.6-10.4)								
Zinc	2 (1.4-4.2)			2 (1.4-3.9)								
1,1-Dichloroethene*							1 (2.0)					
1,1,2-Trichloroethane*							1 (4.8)	1 (4.8)	1 (4.8)			
1,2-Dibromoethane*							2 (1.4-21.4)	2 (1.4-21.4)	2 (1.4-21.4)			
1,2-Dichloroethane*							1 (1.2)	1 (1.2)	1 (1.2)			
2,3,4,6-Tetrachlorophenol	1 (2.6)	1 (2.6)	1 (2.6)	1 (29.3)	1 (29.3)	1 (29.3)						
2,4,5-Trichlorophenol	1 (2.9)	1 (2.9)	1 (2.9)	1 (4.4)	1 (4.4)	1 (4.4)						
2,4,6-Trichlorophenol*	1 (1.3)	1 (1.3)	1 (1.3)	1 (16.0)	1 (16.0)	1 (16.0)	1 (7.7)	1 (7.7)	1 (7.7)	1 (3.9)	1 (3.9)	1 (3.9)
TOTAL	24	11	11	77	32	29	23	15	14	8	4	4

NOTE: Numbers in parentheses represent magnitude of exclusions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection (R=10^{-6}).
[a] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 2, and Organics Option 1.
[b] Regulatory Option 2 = The combination of Metals Option 3, Oils Option 3, and Organics Option 1.

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Table 18. Metals Subcategory - Pollutants Discharged From 36 Indirect Centralized Waste Treatment Facilities (Discharging to 28 POTWs on 28 Receiving Streams)

Pollutant Name	Number of Detections by Facility
ACETOPHENONE	29
ALUMINUM	34
AMENABLE CYANIDE	35
AMMONIA AS N	36
ANTIMONY	34
ARSENIC	34
BARIUM	34
BENZOIC ACID	34
BENZYL ALCOHOL	30
BIPHENYL	29
BIS(2-ETHYLHEXYL)PHTHALATE	26
BORON	36
CADMIUM	32
CALCIUM	36
CARBON DISULFIDE	26
CHROMIUM	34
COBALT	34
COPPER	34
CYANIDE	36
DIPHENYL ETHER	30
ETHYL BENZENE	26
FLUORIDE	36
HEX CHROMIUM	34
HEXANOIC ACID	33
IODINE	36
IRIDIUM	35
IRON	35
LEAD	34
LITHIUM	36
LUTETIUM	31
MAGNESIUM	36
MANGANESE	34
MERCURY	26
METHYLENE CHLORIDE	26
MOLYBDENUM	35
N-DECANE	34
N-DODECANE	34
N-EICOSANE	34
N-HEXADECANE	34
N-OCTADECANE	31
N-TETRADECANE	34
N,N-DIMETHYLFORMAMIDE	30

Table 18. Metals Subcategory - Pollutants Discharged From 36 Indirect Centralized Waste Treatment Facilities (Discharging to 28 POTWs on 28 Receiving Streams) (continued)

Pollutant Name	Number of Detections by Facility
NAPHTHALENE	30
NICKEL	34
NITRATE-NITRITE AS N	36
O+P XYLENE	26
PHENOL	34
PHOSPHORUS	34
POTASSIUM	36
RHENIUM	34
SELENIUM	30
SILICON	36
SILVER	34
SODIUM	36
STRONTIUM	34
STYRENE	34
SULFIDE	34
SULFUR	36
TANTALUM	34
TELLURIUM	34
TETRACHLOROETHENE	26
THALLIUM	31
TIN	36
TITANIUM	34
TOLUENE	31
TOTAL PHENOLS	35
TOTAL PHOSPHORUS	36
TUNGSTEN	34
URANIUM	34
VANADIUM	35
ZINC	34
1,1-DICHLOROETHANE	12
1,1-DICHLOROETHENE	29
1,1,1-TRICHLOROETHANE	30
1,4-DIOXANE	34
2-BUTANONE	34
2-METHYLNAPHTHALENE	30
2-PROPANONE	34
4-CHLORO 3-METHYLPHENOL	30
4-METHYL 2-PENTANONE	33

Source: Engineering and Analysis Division (EAD), December 1993.

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Subcategory: Metals / Indirect Dischargers
Number of Facilities: **36**
Number of POTWs: **28**
Number of Receiving Streams: **28**
Number of Pollutants Discharged: **80**

Table 19. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Current					
Streams (No.)	6	14	7	0	14
Pollutants (No.)	2 (1.0 - 9.4)	9 (1.1 - 34.8)	1 (1.1 - 5.7)	0	10
Carcinogens (No.)**	NA	NA	1 (1.1 - 5.7)	NA	1
Total Excursions	7	30	7	0	
Proposed Option					
Streams (No.)	0	2	0	0	2
Pollutants (No.)	0	1 (1.2 - 2.6)	0	0	1
Carcinogens (No.)**	NA	NA	0	NA	0
Total Excursions	0	2	0	0	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
NA = Not Applicable.

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Subcategory: Metals / Indirect Dischargers
Number of Facilities: **36**
Number of POTWs: **28**
Number of Receiving Streams: **28**
Number of Pollutants Discharged: **80**

Table 20. Summary of Pollutants Projected to Exceed Criteria for Centralized Waste Treatment Discharges

	Acute Aquatic Life		Chronic Aquatic Life		Human Health Water and Organisms		Human Health Organisms Only	
	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option
Arsenic*					7 (1.1-5.7)			
Boron			2 (1.6-3.0)					
Cyanide	6 (1.0-9.4)		14 (1.1-34.8)	2 (1.2-2.6)				
Hexchromium	1 (1.0)		1 (1.3)					
Mercury			1 (1.7)					
Molybdenum			1 (1.7)					
N-Decane			4 (1.1-5.3)					
Silver			2 (1.1-2.1)					
Tin			2 (1.9-3.6)					
Vanadium			3 (1.1-4.9)					
TOTAL	7	0	30	2	7	0	0	0

NOTE: Numbers in parentheses represent magnitude of excursions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection (R = 10^{-6}).

Subcategory: Metals / Indirect Dischargers
Number of Facilities: **38**
Number of POTWs: **30**
Number of Pollutants Discharged: **80**

Table 21. Summary of Projected POTW Inhibition and Sludge Contamination Problems for Centralized Waste Treatment Discharges

	Biological Inhibition	Sludge Contamination	Total*
Current			
POTWs (No.)	9	11	11
Pollutants (No.)	1 (1.1 - 24.4)	3 (1.1 - 33.7)	4
Total Problems	**9**	**14**	
Proposed Option			
POTWs (No.)	2	1	2
Pollutants (No.)	1 (2.9 - 4.3)	1 (1.5)	2
Total Problems	**2**	**1**	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed inhibition/sludge contamination values at a number of POTWs; therefore, total does not equal sum of pollutants exceeding values.

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Subcategory: Metals / Indirect Dischargers
Number of Facilities: **38**
Number of POTWs: **30**
Number of Pollutants Discharged: **80**

Table 22. Summary of Pollutants Projected to Exceed Inhibition/Sludge Contamination Values for Centralized Waste Treatment Discharges

	Biological Inhibition		Sludge Contamination	
	Current	Proposed Option	Current	Proposed Option
Arsenic			2 (2.2 - 3.2)	
Boron	9 (1.1 - 24.4)	2 (2.9 - 4.3)		
Cadmium			1 (1.3)	
Molybdenum			11 (1.1 - 33.7)	1 (1.5)
TOTAL	9	2	14	1

NOTE: Numbers in parentheses represent magnitude of excursions.

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Table 23. Oils Subcategory - Pollutants Discharged From 24 Indirect Centralized Waste Treatment Facilities (Discharging to 18 POTWs on 18 Receiving Streams)

Pollutant Name	Number of Detections by Facility
ALUMINUM	24
AMMONIA AS N	24
ANTIMONY	22
ARSENIC	21
BARIUM	22
BENZENE	24
BENZOIC ACID	24
BORON	24
CADMIUM	21
CALCIUM	24
CHROMIUM	23
COBALT	23
COPPER	23
ETHYL BENZENE	24
FLUORIDE	24
HEXANOIC ACID	24
IRON	24
LEAD	24
M-XYLENE	24
MAGNESIUM	24
MANGANESE	24
METHYLENE CHLORIDE	23
MOLYBDENUM	24
N-DECANE	23
N-DOCOSANE	23
N-DODECANE	23
N-EICOSANE	23
N-HEXACOSANE	23
N-HEXADECANE	23
N-OCTADECANE	23
N-TETRADECANE	23
NICKEL	24
NITRATE-NITRITE AS N	24
O+P XYLENE	24
PHENOL	24
SILVER	22
SODIUM	24
SULFIDE	22
TETRACHLOROETHENE	22
TIN	22
TITANIUM	22
TOLUENE	24
TOTAL PHENOLS	24
TOTAL PHOSPHORUS	24
TRIPROPYLENEGLYCOL METHYL ETHER	24
ZINC	24
1,1,1-TRICHLOROETHANE	24
2-BUTANONE	24
2-PROPANONE	24
4-CHLORO 3-METHYLPHENOL	24

Source: Engineering and Analysis Division (EAD), December 1993. 12/5/94

Subcategory: Oils / Indirect Dischargers
Number of Facilities: **24**
Number of POTWs: **18**
Number of Receiving Streams: **18**
Number of Pollutants Discharged: **50**

Table 24. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Current					
Streams (No.)	0	5	1	0	5
Pollutants (No.)	0	4 (1.1 - 37.6)	1 (1.2)	0	5
Carcinogens (No.)**	NA	NA	1 (1.2)	NA	1
Total Excursions	**0**	**9**	**1**	**0**	
Proposed Oils Option 2					
Streams (No.)	0	0	0	0	0
Pollutants (No.)	0	0	0	0	0
Carcinogens (No.)**	NA	NA	0	NA	0
Total Excursions	**0**	**0**	**0**	**0**	
Proposed Oils Option 3					
Streams (No.)	0	0	0	0	0
Pollutants (No.)	0	0	0	0	0
Carcinogens (No.)**	NA	NA	0	NA	0
Total Excursions	**0**	**0**	**0**	**0**	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
NA = Not Applicable.

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Subcategory: Oils / Indirect Dischargers
Number of Facilities: **24**
Number of POTWs: **18**
Number of Receiving Streams: **18**
Number of Pollutants Discharged: **50**

Table 25. Summary of Pollutants Projected to Exceed Criteria for Centralized Waste Treatment Discharges

	Acute Aquatic Life			Chronic Aquatic Life			Human Health Water and Organisms			Human Health Organisms Only		
	Current	Proposed Oils Option 2	Proposed Oils Option 3	Current	Proposed Oils Option 2	Proposed Oils Option 3	Current	Proposed Oils Option 2	Proposed Oils Option 3	Current	Proposed Oils Option 2	Proposed Oils Option 3
Aluminum				1 (1.1)								
Arsenic*							1 (1.2)					
Boron				2 (1.4-5.1)								
N-Decane				5 (2.1-37.6)								
Silver				1 (1.5)								
TOTAL	0	0	0	9	0	0	1	0	0	0	0	0

NOTE: Numbers in parentheses represent magnitude of excursions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection ($R = 10^{-6}$).

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Subcategory: Oils / Indirect Dischargers
Number of Facilities: **25**
Number of POTWs: **19**
Number of Pollutants Discharged: **50**

Table 26. Summary of Projected POTW Inhibition and Sludge Contamination Problems for Centralized Waste Treatment Discharges

	Biological Inhibition	Sludge Contamination	Total*
Current			
POTWs (No.)	11	1	11
Pollutants (No.)	1 (1.0 - 31.7)	2 (1.3 - 1.8)	3
Total Problems	**11**	**2**	
Proposed Oils Option 2			
POTWs (No.)	3	0	3
Pollutants (No.)	1 (2.0 - 5.7)	0	1
Total Problems	**3**	**0**	
Proposed Oils Option 3			
POTWs (No.)	3	0	3
Pollutants (No.)	1 (1.7 - 4.8)	0	1
Total Problems	**3**	**0**	

NOTE: Numbers in parentheses represent magnitude of excursions.

* Pollutants may exceed inhibition/sludge contamination values at a number of POTWs; therefore, total does not equal sum of pollutants exceeding values.

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Subcategory: Oils / Indirect Dischargers
Number of Facilities: 25
Number of POTWs: 19
Number of Pollutants Discharged: **50**

Table 27. Summary of Pollutants Projected to Exceed Inhibition/Sludge Contamination Values for Centralized Waste Treatment Discharges

	Biological Inhibition			Sludge Contamination		
	Current	Proposed Oils Option 2	Proposed Oils Option 3	Current	Proposed Oils Option 2	Proposed Oils Option 3
Boron	11 (1.0-31.7)	3 (2.0-5.7)	3 (1.7-4.8)			
Molybdenum				1 (1.8)		
Nickel				1 (1.3)		
TOTAL	11	3	3	2	0	0

NOTE: Numbers in parentheses represent magnitude of excursions.

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Table 28. Organics Subcategory - Pollutants Discharged From 15 Indirect Centralized Waste Treatment Facilities (Discharging to 15 POTW on 15 Receiving Streams)

Pollutant Name	Number of Detections by Facility
ACETOPHENONE	11
ALUMINUM	15
AMENABLE CYANIDE	12
AMMONIA AS N	15
ANITMONY	10
ARSENIC	10
BARIUM	11
BENZENE	14
BENZOIC ACID	14
BENZYL ALCOHOL	14
BORON	15
BROMODICHLOROMETHANE	11
CALCIUM	15
CARBON DISULFIDE	11
CHLOROBENZENE	11
CHLOROFORM	14
CHROMIUM	10
COBALT	10
COPPER	11
CYANIDE	13
DIETHYL ETHER	13
ETHYL BENZENE	11
FLUORIDE	14
HEXANOIC ACID	13
IODINE	13
IRON	15
ISOPHORONE	12
LEAD	10
LITHIUM	13
M-XYLENE	11
MAGNESIUM	14
MANGANESE	11
MERCURY	4
METHYLENE CHLORIDE	15
MOLYBDENUM	11
N,N-DIMETHYLFORMAMIDE	15
NAPHTHALENE	11
NICKEL	11
NITRATE-NITRITE AS N	15
O+P XYLENE	11
O-CRESOL	14
P-CRESOL	14
PENTACHLOROPHENOL	14
PHENOL	14
PHOSPHORUS	13
POTASSIUM	14
PYRIDINE	14
SILICON	13
SODIUM	15
STRONTIUM	13
SULFIDE	14
SULFUR	14
TETRACHLOROETHENE	13
TETRACHLOROMETHANE	11
TIN	11
TITANIUM	14

Table 28. Organics Subcategory - Pollutants Discharged From 15 Indirect Centralized Waste Treatment Facilities (Discharging to 15 POTW on 15 Receiving Streams) (continued)

Pollutant Name	Number of Detections by Facility
TOLUENE	15
TOTAL PHENOLS	14
TOTAL PHOSPHORUS	14
TRANS-1,2-DICHLOROETHENE	11
TRICHLOROETHENE	14
TRICHLOROFLUOROMETHANE	11
VINYL CHLORIDE	11
ZINC	11
1,1-DICHLOROETHANE	11
1,1-DICHLOROETHENE	11
1,1,1-TRICHLOROETHANE	11
1,1,1,2-TETRACHLOROETHANE	11
1,1,2-TRICHLOROETHANE	11
1,2-DIBROMOETHANE	14
1,2-DICHLOROBENZENE	13
1,2-DICHLOROETHANE	14
1,2,3-TRICHLOROPROPANE	11
2-BUTANONE	15
2-CHLOROPHENOL	11
2-HEXANONE	15
2-PICOLINE	14
2-PROPANONE	15
2,3-DICHLOROANILINE	11
2,3,4,6-TETRACHLOROPHENOL	14
2,4-DIMETHYLPHENOL	11
2,4,5-TRICHLOROPHENOL	11
2,4,6-TRICHLOROPHENOL	11
4-METHYL 2-PENTANONE	14

Source: Engineering and Analysis Division (EAD), December 1993. 12/5/94

Subcategory: Organics / Indirect Dischargers
Number of Facilities: **15**
Number of POTWs: **15**
Number of Receiving Streams: **15**
Number of Pollutants Discharged: **84**

Table 29. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Baseline					
Streams (No.)	0	0	11	3	11
Pollutants (No.)	0	0	3 (1.0 - 589)	1 (1.8 - 18.1)	3
Carcinogens (No.)**	NA	NA	3 (1.0 - 589)	NA	3
Total Excursions	**0**	**0**	**15**	**3**	
Proposed Option					
Streams (No.)	0	0	2	0	2
Pollutants (No.)	0	0	1 (1.7 - 11.3)	0	1
Carcinogens (No.)**	NA	NA	1 (1.7 - 11.3)	NA	1
Total Excursions	**0**	**0**	**2**	**0**	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
NA = Not Applicable.

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Subcategory: Organics / Indirect Dischargers
Number of Facilities: **15**
Number of POTWs: **15**
Number of Receiving Streams: **15**
Number of Pollutants Discharged: **84**

Table 30. Summary of Pollutants Projected to Exceed Criteria for Centralized Waste Treatment Discharges

	Acute Aquatic Life		Chronic Aquatic Life		Human Health Water and Organisms		Human Health Organisms Only	
	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option	Current	Proposed Option
Methylene Chloride*					3 (1.9 - 19.0)			
Pentachlorophenol*					1 (2.1)			
1,2-Dibromoethane*					11 (1.0 - 589)	2 (1.7 - 11.3)	3 (1.8 - 18.1)	
TOTAL	0	0	0	0	15	2	3	0

NOTE: Numbers in parentheses represent magnitude of excursions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection ($R = 10^{-6}$).

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Subcategory: Organics / Indirect Dischargers
Number of Facilities: **15**
Number of POTWs: **15**
Number of Pollutants Discharged: **84**

Table 31. Summary of Projected POTW Inhibition and Sludge Contamination Problems

	Biological Inhibition	Sludge Contamination	Total
Current			
POTWs (No.)	0	0	0
Pollutants (No.)	0	0	0
Total Problems	**0**	**0**	
Proposed Option			
POTWs (No.)	0	0	0
Pollutants (No.)	0	0	0
Total Problems	**0**	**0**	

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Table 32. Multiple Subcategory Combinations - Pollutants Discharged From 45 Indirect Centralized Waste Treatment Facilities (Discharging to 33 POTWs on 33 Receiving Streams)

Pollutant Name	Number of Detections by Stream
ACETOPHENONE	28
ALUMINUM	32
AMENABLE CYANIDE	29
AMMONIA AS N	33
ANITMONY	32
ARSENIC	31
BARIUM	32
BENZENE	23
BENZOIC ACID	32
BENZYL ALCOHOL	29
BIPHENYL	25
BIS(2-ETHYLHEXYL)PHTHALATE	22
BORON	33
BROMODICHLOROMETHANE	11
CADMIUM	29
CALCIUM	33
CARBON DISULFIDE	26
CHLOROBENZENE	11
CHLOROFORM	14
CHROMIUM	32
COBALT	32
COPPER	32
CYANIDE	30
DIETHYL ETHER	13
DIPHENYL ETHER	26
ETHYL BENZENE	31
FLUORIDE	33
HEX CHROMIUM	26
HEXANOIC ACID	32
IODINE	30
IRIDIUM	27
IRON	32
ISOPHORONE	12
LEAD	32
LITHIUM	30
LUTETIUM	26
M-XYLENE	22
MAGNESIUM	33
MANGANESE	32
MERCURY	24
METHYLENE CHLORIDE	31
MOLYBDENUM	32
N-DECANE	31
N-DOCOSANE	18
N-DODECANE	31
N-EICOSANE	31
N-HEXACOSANE	18
N-HEXADECANE	31
N-OCTADECANE	31
N-TETRADECANE	31
N,N-DIMETHYL FORMAMIDE	29
NAPHTHALENE	29
NICKEL	32
NITRATE-NITRITE AS N	33
O+P XYLENE	31

Table 32. Multiple Subcategory Combinations - Pollutants Discharged From 45 Indirect Centralized Waste Treatment Facilities (Discharging to 33 POTWs on 33 Receiving Streams) (continued)

Pollutant Name	Number of Detections by Stream
O-CRESOL	14
P-CRESOL	14
PENTACHLOROPHENOL	14
PHENOL	32
PHOSPHORUS	29
POTASSIUM	30
PYRIDINE	14
RHENIUM	26
SELENIUM	26
SILICON	30
SILVER	30
SODIUM	33
STRONTIUM	29
STYRENE	26
SULFIDE	32
SULFUR	30
TANTALUM	26
TELLURIUM	26
TETRACHLOROETHENE	31
TETRACHLOROMETHANE	11
THALLIUM	26
TIN	33
TITANIUM	32
TOLUENE	32
TOTAL PHENOLS	32
TOTAL PHOSPHORUS	33
TRANS-1,2-DICHLOROETHENE	11
TRICHLOROETHENE	14
TRICHLOROFLUOROMETHANE	11
TRIPROPYLENEGLYCOL METHYL ETHER	18
TUNGSTEN	26
URANIUM	26
VANADIUM	27
VINYL CHLORIDE	11
ZINC	32
1,1-DICHLOROETHANE	17
1,1-DICHLOROETHENE	28
1,1,1-TRICHLOROETHANE	32
1,1,1,2-TETRACHLOROETHANE	11
1,1,2-TRICHLOROETHANE	11
1,2-DIBROMOETHANE	14
1,2-DICHLOROBENZENE	13
1,2-DICHLOROETHANE	14
1,2,3-TRICHLOROPROPANE	11
1,4-DIOXANE	261
2-BUTANONE	32
2-CHLOROPHENOL	11
2-HEXANONE	15
2-METHYLNAPHTHALENE	26
2-PICOLINE	14
2-PROPANONE	32
2,3-DICHLOROANILINE	11
2,3,4,6-TETRACHLOROPHENOL	14
2,4-DIMETHYLPHENOL	11
2,4,5-TRICHLOROPHENOL	11
2,4,6-TRICHLOROPHENOL	11
4-CHLORO 3-METHYLPHENOL	31
4-METHYL 2-PENTANONE	29

Source: Engineering and Analysis Division (EAD), December 1993.

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Subcategory: Combined / Indirect Dischargers
Number of Facilities: **45**
Number of POTWs: **33**
Number of Receiving Streams: **33**
Number of Pollutants Discharged: **113**

Table 33. Summary of Projected Criteria Excursions for Centralized Waste Treatment Discharges

	Acute Aquatic Life	Chronic Aquatic Life	Human Health Water and Orgs.	Human Health Orgs. Only	Total*
Current					
Streams (No.)	6	16	17	3	22
Pollutants (No.)	2 (1.0-9.4)	10 (1.1-37.8)	4 (1.0-589)	1 (1.8-18.1)	14
Carcinogens (No.)**	NA	NA	4 (1.0-589)	NA	4
Total Excursions	7	38	23	3	
Regulatory Option 1[a]					
Streams (No.)					
Pollutants (No.)	0	2	2	0	4
Carcinogens (No.)**	0	1 (1.2-2.6)	1 (1.7-11.3)	0	2
Total Excursions	NA	NA	1 (1.7-11.3)	NA	1
	0	2	2	0	
Regulatory Option 2[b]					
Streams (No.)	0	2	2	0	4
Pollutants (No.)	0	1 (1.2-2.6)	1 (1.7-11.3)	0	2
Carcinogens (No.)**	NA	NA	1 (1.7-11.3)	NA	1
Total Excursions	0	2	2	0	

NOTE: Numbers in parentheses represent magnitude of excursions.
* Pollutants may exceed criteria on a number of streams; therefore, total does not equal sum of pollutants exceeding criteria.
** Carcinogens - Pollutants with human health toxicity values set for carcinogenicity protection ($R=10^{-6}$).
[a] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 2, and Organics Option 1.
[b] Regulatory Option 2 = The combination of Metals Option 3, Oils Option 3, and Organics Option 1.
NA = Not Applicable.

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Subcategory: Combined / Indirect Dischargers
Number of Facilities: **45**
Number of POTWs: **33**
Number of Receiving Streams: **33**
Number of Pollutants Discharged: **113**

Table 34. Summary of Pollutants Projected to Exceed Criteria for Centralized Waste Treatment Discharges

	Acute Aquatic Life			Chronic Aquatic Life			Human Health Water and Organisms			Human Health Organisms Only		
	Current	Regulatory Option 1[a]	Regulatory Option 2[b]	Current	Regulatory Option 1[a]	Regulatory Option 2[b]	Current	Regulatory Option 1[a]	Regulatory Option 2[b]	Current	Regulatory Option 1[a]	Regulatory Option 2[b]
Aluminum				1 (1.1)								
Arsenic*							8 (1.1-5.7)					
Boron				4 (1.2-5.2)								
Cyanide	6 (1.0-9.4)			14 (1.2-34.8)	2 (1.2-2.6)	2 (1.2-2.6)						
Hexchromium	1 (1.0)			1 (1.3)								
Mercury				1 (1.7)								
Methylene Chloride*							3 (1.9-19.0)					
Molybdenum				1 (1.7)								
N-Decane				8 (1.1-37.8)								
Pentachlorophenol*							1 (2.1)					
Silver				3 (1.1-2.5)								
Tin				2 (1.9-3.6)								
Vanadium				3 (1.1-4.9)								
1,2-Dibromoethane*							11 (1.0-589)	2 (1.7-11.3)	2 (1.7-11.3)	3 (1.8-18.1)		
TOTAL	7	0	0	38	2	2	23	2	2	3	0	0

NOTE: Numbers in parentheses represent magnitude of excursions.
* Carcinogen - Pollutant with human health toxicity values set for carcinogenicity protection ($R = 10^{-6}$).
[a] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 2, and Organics Option 1.
[b] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 3, and Organics Option 1.

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Subcategory: Combined / Indirect Dischargers
Number of Facilities: **47**
Number of POTWs: **35**
Number of Pollutants Discharged: **113**

Table 35. Summary of Projected POTW Inhibition and Sludge Contamination Problems for Centralized Waste Treatment Discharges

	Biological Inhibition	Sludge Contamination	Total*
Current			
POTWs (No.)	17	13	19
Pollutants (No.)	1 (1.1 - 36.0)	4 (1.1 - 34.4)	5
Total Problems	**17**	**17**	
Regulatory Option 1[a]			
POTWs (No.)	6	1	6
Pollutants (No.)	1 (1.1 - 6.4)	1 (1.8)	2
Total Problems	**6**	**1**	
Regulatory Option 2[b]			
POTWs (No.)	6	1	6
Pollutants (No.)	1 (1.1 - 6.1)	1 (1.5)	2
Total Problems	**6**	**1**	

NOTE: Numbers in parentheses represent magnitude of excursions.

* Pollutants may exceed inhibition/sludge contamination values at a number of POTWs; therefore, total does not equal sum of pollutants exceeding values.

[a] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 2, and Organics Option 1.

[b] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 3, and Organics Option 1.

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Subcategory: Combined / Indirect Dischargers
Number of Facilities: **47**
Number of POTWs: **35**
Number of Pollutants Discharged: **113**

Table 36. Summary of Pollutants Projected to Exceed Inhibition/Sludge Contamination Values for Centralized Waste Treatment Discharges

	Biological Inhibition			Sludge Contamination		
	Current	Regulatory Option 1[a]	Regulatory Option 2[b]	Current	Regulatory Option 1[a]	Regulatory Option 2[b]
Arsenic				2 (2.2 - 3.3)		
Boron	17 (1.1 - 36.0)	6 (1.1 - 6.4)	6 (1.1 - 6.1)			
Cadmium				1 (1.4)		
Molybdenum				13 (1.1 - 34.4)	1 (1.8)	1 (1.5)
Nickel				1 (1.3)		
TOTAL	17	6	6	17	1	1

NOTE: Numbers in parentheses represent magnitude of excursions.
[a] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 2, and Organics Option 1.
[b] Regulatory Option 1 = The combination of Metals Option 3, Oils Option 3, and Organics Option 1.

Table 37. Documented Environmental Impacts of Centralized Waste Treatment Wastes on POTW Operations and Water Quality

POTW	Identified Impacts
Case #1	High concentrations of nitrate, nitrite and sodium in CWT's batch discharges responsible for interference of POTW operations (1993/1994). High chlorine demand of discharges caused loss of chlorine residual and resulted in POTW fecal coliform violations; $5000 fine is pending.
Case #2	Permit violations for phosphorus and total cyanide (1992/1993). Discharge of high levels of cyanide caused interference of POTW operations and resulted in $10,000 fine.
Case #3	Municipality below POTW developed drinking water taste and odor problems. Organics discharged by CWT identified as source.
Case #4	Permit violations of Total Toxic Organics (TTO), cyanide, nickel, fats, oils and grease (FOG), lead, zinc and mercury (1989-1990). Resulted in $60,000 fine.
Case #5	Zinc pass-through from CWT discharge caused POTW NPDES violations (1991)
Case #6	Ammonia-nitrate pass-through from CWT discharge caused POTW NPDES violations due to nitrification inhibition (1991/1992)
Case #7	Zinc pass-through from CWT discharge caused POTW NPDES violations on 3 occasions (1993)
Case #8	High strength ammonia discharge from CWT caused inhibition problems resulting in low pH POTW NPDES violations on 3 occasions (1991).

Source: EPA Regional and State Pretreatment Coordinators, 1994. 12/5/94

Table 38. Centralized Waste Treatment Facilities Included on State 304(L) Short Lists

NPDES	Facility Name	City	Waterbody	Reach Number	Listed Pollutants
AL0003247	Sloss Industries	Birmingham	Five Mile Creek	03160111006	Cadmium, Copper, Cyanide, Lead, Zinc
CT0001376	Pratt & Whitney	East Hartford	Willow Brook (Connecticut River)	01080205024	Copper, Nickel, Zinc
NJ0003867	CP Chemicals	Sewaren	Woodbridge Creek (Arthur Kill)	02030104003	Copper, Lead, Nickel, Zinc
PA0027715	Mill Service	Yukon	Sewickley Creek	05020006045	Copper, Lead, Silver

Source: Compiled from OW files dated April/May 1991.

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Table 39. POTWs Which Receive Discharge From Centralized Waste Treatment Facilities and are Included on State 304(L) Short Lists

Facility Name	City	Receiving POTW	POTW NPDES	Waterbody	Reach Number	Pollutants
Clean Harbors	Baltimore	Back River WWTP	MD0021555	Back River to Curtis Bay	18050004002	Lead, Mercury, Selenium
Environmental Waste Control	Inkster	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
Edwards Oil	Detroit	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
DYNECOL	Detroit	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
American Tank Service	Ferndale	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
American Waste Oil	Belleville	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
CYANOKEM	Detroit	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
Chemical Waste Management	Newark	Passaic Valley Sewage Comm.	NJ0021016	Upper New York Bay	02030104001	Cadmium, Lead, Mercury
Waste Conversion	Hatfield	Hatfield TWP Mun. Authority	PA0026247	W.B. Neshaminy Creek to Neshaminy River	02040201011	27 Organics
Envirite	York	Springettsbury TWP	PA0026808	Codorus Creek	02050306066	--
ETICAM	Warwick	Warwick WWTP	RI0100234	Pawtuxet River	01090004029	Lead, Silver
Belpar Environmental	Prince George	Hopewell POTW	VA0066630	Gravelly Run to James River	02080206041	Copper, Lead, Zinc
Crosby and Overton	Kent	Metro (Renton STP)	WA0029581	Green River	17110013004	--

Source: Compiled From OW Files Dated April/May 1991.

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