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Final

Point Source Category

Volume II

DEVELOPMENT DOCUMENT

for

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS

for the

NONFERROUS METALS FORMING AND METAL POWDERS POINT SOURCE CATEGORY

VOLUME II

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This document is divided into three volumes. Volume I contains Sections I through IV. Volume II contains Sections V and VI. Volume III contains Sections VII through XVI.

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SECTION V

WATER USE AND WASTEWATER CHARACTERISTICS

This section presents a summary of the analytical data that characterize the raw wastewater in the category. Flow data that serve as the basis for developing regulatory flow allowances in the nonferrous metals forming category are also summarized in this section. The analytical and flow data were obtained from four sources: information obtained during a telephone survey; data collection portfolios (dcps); sampling and analysis programs; and long-term or historical data. Confidential information was handled in accordance with 40 CFR Part 2.

DATA SOURCES

Telephone Survey

As described in Section III of this document, a comprehensive telephone survey was undertaken in order to determine which companies should be included on the dcp mailing list, i.e., whether or not operations within the scope of this category were performed by the companies contacted. In the telephone survey, the contact at the company was asked what metals were formed, the type of forming operations (rolling, drawing, extruding, forging, casting, cladding, powder metallurgy), what surface treatment, cleaning, washing, and rinsing operations were used, the water use associated with all operations, how wastewater was disposed of, and if there was any treatment in place. In addition to the telephone contacts made during the comprehensive survey, many plants were contacted by telephone to clarify dcp responses.

Data Collection Portfolios

Data collection portfolios (dcps) are questionnaires which were developed by the Agency to obtain extensive data from plants in the nonferrous metals forming category. The dcps, sent to all companies known or believed to be engaged in nonferrous metals forming, requested information under the authority of Section 308 of the Clean Water Act. The information requested included plant age, production, number of employees, water usage, manufacturing processes, raw material and process chemical usage, wastewater treatment technologies, and the presence (known or believed) of toxic pollutants in the plant's raw and treated process wastewaters.

Complete dcp responses supplied the following information for each operation present at the responding plant: the total production in 1981, the average production rate (lb/hr), production rate at full capacity, and the quantity and rate of wastewater discharge. As discussed in Section IV, a mass-based regulation must relate water use and raw waste characteristics to some production normalizing parameter. The average production rate is considered to be the parameter most applicable to operations in this category, and has been used to normalize the water and wastewater flows discussed in this section.

Two production normalized flows (PNF's) were calculated for each operation reported in the dcps. The first PNF is water use, defined as the volume of water or other fluid (e.g., emulsions, lubricants) required per mass of metal processed through the operation. Water use is based on the sum of recycle and make-up flows to a given process. The second PNF calculated for each operation is production normalized water discharge, defined as the volume of wastewater discharged from a given process to further treatment, disposal, or discharge per mass of nonferrous metal processed. Differences between the water use and wastewater flows associated with a given stream result from recycle, evaporation, and carryover (or drag-out) on the product. The production values in this calculation correspond to the production normalizing parameter, PNP, assigned to each stream, as outlined in Section IV.

The wastewater flows reported in the dcps were production normalized and grouped by waste stream. The production normalized flow information for each waste stream is presented in this section. An analysis of factors affecting the wastewater flows is presented in Sections IX and X where representative BPT, BAT, NSPS, and pretreatment discharge flow allowances are selected for use in calculating the effluent limitations and standards.

Sampling and Analysis Program

The sampling and analysis program was undertaken primarily to identify pollutants of concern in the industry, with emphasis on priority pollutants. Wastewater samples were collected at 23 nonferrous metals forming facilities.

This section summarizes the activities undertaken during the sampling trips and identifies the types of sites sampled and the parameters analyzed. It also presents an overview of sample collection, preservation, and transportation techniques. Finally, it describes the pollutant parameters quantified, the methods of analyses and laboratories used, the detectable concentration of each pollutant, and the general approach used to ensure the reliability of the analytical data produced.

Site Selection. Twenty-five sampling episodes were conducted to obtain data to support the development of these regulations. Four of these plants were sampled in data gathering efforts supporting the development of guidelines for other industrial categories (nonferrous metals manufacturing and battery manufacturing). Information on nonferrous metals forming operations was collected incidentally to the major sampling effort at these plants. Twenty-one episodes were carried out specifically to gather data to support limitations and standards for this category. These plants were selected to be representative of the industry, based on information obtained during the telephone survey. Considerations included how well each facility represented the subcategory as indicated by available data, potential problems in meeting technology-based standards, differences in production processes used, and wastewater treatment-in-place. At least one plant in every subcategory was sampled. Two plants provided data for more than one subcategory.

As indicated in Table V-1, the plants selected for sampling were typically plants with multiple forming operations and associated surface and heat treatment operations. Based on information from the telephone survey and the dcps, the flow rates and pollutant concentrations in the wastewaters discharged from the manufacturing operations at these plants are believed to be representative of the flow rates and pollutant concentrations which would be found in wastewaters generated by similar operations at any plant in the nonferrous metals forming category. The sampled plants have a variety of treatment systems in place, ranging from plants with no treatment to plants using the technologies considered as the basis for regulation.

<u>Field Sampling</u>. After selection of the plants to be sampled, personnel at each plant were contacted by telephone, and notified by letter when a visit would be expected as authorized by Section 308 of the Clean Water Act. In most cases, a preliminary visit was made to the plant to select the sources of wastewater to be sampled. The sample points included, but were not limited to, untreated and treated discharges, process wastewater, partially treated wastewater, and intake water. The actual sampling visit was also scheduled during the preliminary visit.

<u>Sample Collection, Preservation, and Transportation</u>. Collection, preservation, and transportation of samples were accomplished in accordance with procedures outlined in Appendix III of "Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants" (published by the Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, March 1977, revised, April 1977), "Sampling Screening Procedure for the Measurement of Priority Pollutants" (published by the EPA Effluent Guidelines Division, Washington, D.C., October 1976), and in the proposed 304(h) methods (44 FR 69464, December 3, 1979). The procedures are summarized in the paragraphs that follow.

Whenever practical, samples were taken from midchannel at mid-depth in a turbulent, well-mixed portion of the waste stream. Periodically, the temperature and pH of each waste stream sampled were measured on-site.

Each large composite (Type 1) sample was collected in a 9-liter, wide-mouth pickle jar that had been washed with detergent and water, rinsed with tap water, rinsed with distilled water, and air dried at room temperature.

Before collection of Type 1 samples, new Tygon tubing was cut to minimum lengths and installed on the inlet and outlet (suction and discharge) fittings of the automatic sampler. Two liters

(2.1 quarts) of blank water, known to be free of organic compounds and brought to the sampling site from the analytical laboratory, were pumped through the sampler and its attached tubing; the water was then discarded.

A blank (control sample) was produced by pumping an additional 2 liters of blank water through the sampler and into the original blank water bottle. The blank sample was sealed in a Teflon -lined cap, labeled, and packed in ice in a plastic foam--insulated chest. This sample was subsequently analyzed to determine any contamination contributed by the automatic sampler.

During collection of each Type 1 sample, the pickle jar was packed in ice in a plastic foam-insulated container to cool the sample. After the complete composite sample had been collected, it was mixed and a 1-liter aliquot to be used for metals analysis was dispensed into a plastic bottle. The aliquot was preserved on-site by the addition of nitric acid to pH less than 2. Metals samples were stored at room temperature until the end of the sampling trip at which time they were shipped to the appropriate laboratory for analysis.

After removal of the 1-liter metals aliquot, the balance of the composite sample was divided into aliquots to be used for analysis of nonvolatile organics, conventional parameters, and nonconventional parameters. If a portion of the composite sample was requested by a representative of the sampled plant for independent analysis, an aliquot was placed in a sample container supplied by the representative.

Water samples to be analyzed for cyanide, total phenol, oil and grease, and volatile organics were not obtained from the composite sample. Water samples for these analyses were taken as one-time grab samples during the time that the composite sample was collected.

The cyanide, total phenol, and oil and grease samples were stored in new bottles which had been iced and labeled, 1-liter (33.8 ounce) plastic bottles for the cyanide sample, 0.95-liter (1 quart) amber glass bottles for the total phenol sample, and 0.95-liter (1 quart) wide-mouth glass bottles with a Teflon lid liner for the oil and grease sample. The samples were preserved as described below.

Sodium hydroxide was added to each sample to be analyzed for cyanide, until the pH was elevated to 12 or more (as measured using pH paper). Where the presence of chlorine was suspected, the sample was tested for chlorine (which would decompose most of the cyanide) by using potassium iodide/starch paper. If the paper tuned blue (indicating chlorine was present), ascorbic acid crystals were slowly added and dissolved until a drop of the sample produced no change in the color of the test paper. An additional 0.6 gram (0.021 ounce) of ascorbic acid was added, and the sample bottle was sealed (by a Teflon -lined cap), labeled, iced, and shipped for analysis.

Sulfuric acid was added to each sample to be analyzed for total phenol, until the pH was reduced to 2 or less (as measured using pH paper). The sample bottle was sealed, labeled, iced, and shipped for analysis.

Sulfuric acid was added to each sample to be analyzed for oil and grease, until the pH was reduced to 2 or less (as measured using pH test paper). The sample bottle was sealed (by a Teflon lid liner), labeled, iced, and shipped for analysis.

Each sample to be analyzed for volatile organic pollutants was stored in a new 125-ml (4.2-ounce) glass bottle that had been rinsed with tap water and distilled water, heated to 150C (221F) for one hour, and cooled. This method was also used to prepare the septum and lid for each bottle. When used, each bottle was filled to overflowing, sealed with a Teflon -faced silicone septum (Teflon side down), capped, labeled, and iced. Hermetic sealing was verified by inverting and tapping the sealed container to confirm the absence of air bubbles. (If bubbles were found, the bottle was opened, a few additional drops of sample were added, and a new seal was installed.) Samples were maintained hermetically sealed and iced until analyzed.

<u>Sample Analysis</u>. Samples were sent by air to one of the laboratories listed in Table V-2. The samples were analyzed for 23 metals, including seven of the priority metal pollutants (beryllium, cadmium, chromium, copper, nickel, lead, and zinc) using inductively-coupled argon plasma emission spectroscopy (ICAP) as proposed in 44 FR 69464, December 3, 1979. The remaining six priority metal pollutants, with the exception of mercury, were analyzed by atomic absorption spectroscopy (AA) as described in 40 CFR Part 136. Mercury analysis was performed by automated cold vapor atomic absorption. Analysis for the seven priority metals analyzed by ICAP was also performed by AA on 10 percent of the samples to determine test comparability. Because the results showed no significant differences in detection or quantification levels, ICAP data were used for the seven priority metals. Three nonconventional metal pollutants (columbium, tantalum, and tungsten) were analyzed by X-ray fluorescence and uranium was analyzed by fluorometry.

Metals Analyzed by ICAP

Calcium	Iron
Magnesium	Manganese
Sodium	Molybdenum
Aluminum	*Nickel
Boron	*Lead
Barium	Tin
*Beryllium	Titanium
*Cadmium	Vanadium
Cobalt	Yttrium
*Chromium	*Zinc
*Copper	Zirconium
Gold	

Metals Analyzed by AA

*Antimony
*Arsenic
*Selenium
*Thallium
*Mercury
*Silver

Metals Analyzed by X-Ray Fluorescence

Columbium
Tantalum
Tungsten

Metals Analyzed by Fluorometry

Uranium

*Priority metals

Analyses for the organic toxic pollutants were performed by Arthur D. Little, ERCO, IT, Radian Sacramento, S-Cubed, and West Coast Technical Service. Analyses for the toxic metal pollutants were performed by CENTEC, Coors, EPA (Region III), EPA-ESD (Region IV), Radian Austin, Versar, and NUS. Analyses for cyanide, and conventional and nonconventional pollutants were performed by ARO, Edison, EPA (Region III), EPA-ESD (Region IV), NUS, and Radian Austin.

EPA did not expect to find any asbestos in nonferrous metals forming wastewaters because this category only includes metals that have already been refined from ores that might contain asbestos. Therefore, analysis for asbestos fibers was not performed.

Pesticide priority pollutants were also not expected to be significant in the nonferrous metals forming industry. Samples from one facility were analyzed for pesticide priority pollutants by electron capture-gas chromatography by the method specified in 44 FR 69464, December 3, 1979. Pesticides were not detected in these samples, so no other samples were analyzed for these pollutants.

Analyses for the remaining organic priority pollutants (volatile fraction, base/neutral, and acid compounds) were conducted using an isotope dilution method which is a modification of the analytical techniques specified in 44 FR 69464, December 3, 1979. The isotope dilution method has been recently developed to improve the accuracy and reliability of the analysis. A copy of the method is in the record of rulemaking for this final regulation. However, no standard was used in the analysis of 2,3,7,8--tetrachlorodibenzo-p-dioxin (TCDD, pollutant 129). Instead, screening for this compound was performed by comparing analytical results to EPA's gas chromatography/mass spectroscopy (GC/MS) computer file.

Analysis for cyanide used methods specified in 40 CFR Part 136 and described in "Methods for Chemical Analysis for Water and Wastes," EPA-600/4-79-020 (March 1979).

Past studies by EPA and others have identified many nonpriority pollutant parameters useful in characterizing industrial wastewaters and in evaluating treatment process removal efficiencies. Some of these pollutants may also be selected as reliable indicators of the presence of specific priority pollutants. For these reasons, a number of nonpriority pollutants were studied in the course of developing this regulation. These pollutants may be divided into two general groups as shown in Table V-3. Analyses for these pollutants were performed by the methods specified in 40 CFR Part 136 and described in EPA-600/4-79-020.

The analytical quantification levels used in evaluation of the sampling data reflect the accuracy of the analytical methods employed. Below these concentrations, the identification of the individual compounds is possible, but quantification is difficult. Pesticides and PCB's can be analytically quantified at concentrations above 0.005 mg/l, and other organic toxic levels above 0.010 mg/l. Levels associated with toxic metals are as follows: 0.010 mg/l for antimony; 0.010 mg/l for arsenic; 0.005 mg/l for beryllium; 0.020 mg/l for cadmium; 0.020 mg/l for chromium; 0.050 mg/l for copper; 0.02 mg/l for cyanide; 0.050 mg/l for lead; 0.0002 mg/l for mercury; 0.050 mg/l for nickel; 0.010 mg/l for selenium; 0.010 mg/l for silver; 0.010 mg/l for thallium; and 0.020 mg/l for zinc.

The detection limits used were reported with the analytical data and hence are the appropriate limits to apply to the data, rather than the method analytical quantification level. Detection limit variation can occur as a result of a number of laboratory-specific, equipment-specific, daily operator-specific, and pollutant-specific factors. These factors can include day-to-day differences in machine calibration and variation in stock solutions, operators, and pollutant sample matrices (i.e., presence of some chemicals will alter the detection of particular pollutants).

Quality Control. Quality control measures used in performing all analyses conducted for this program complied with the guidelines given in "Handbook for Analytical Quality Control in Water and Wastewater Laboratories" (published by EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, 1976). As part of the daily quality control program, blanks (including sealed samples of blank water carried to each sampling site and returned unopened, as well as samples of blank water used in the field), standards, and spiked samples were routinely analyzed with actual samples. As part of the overall program, all analytical instruments (such as balances, spectrophotometers, and recorders) were routinely maintained and calibrated.

Historical Data

A useful source of long-term or historical data available for nonferrous metals forming plants are the Discharge Monitoring Reports (DMR's) filed to comply with National Pollutant Discharge Elimination System (NPDES) or State Pollutant Discharge Elimination System (SPDES) requirements. DMR's were obtained through the EPA Regional offices and state regulatory agencies for the years 1981 through the most recent date available. The DMR's present a summary of the analytical results from a series of samples taken during a given month for the pollutants designated in the plant's permit. In general, minimum, maximum, and average values, in mg/l or lbs/day, are presented for such pollutants as total suspended solids, oil and grease, pH, chromium, and zinc. The samples were collected from the plant outfall(s), which represents the discharge(s) from the plant. For facilities with wastewater treatment, the DMR's provide a measure of the performance of the treatment system. In theory, these data could serve as a basis for characterizing treated wastewater from nonferrous metals forming plants. However, there is no information on concentration of pollutants in wastewater prior to treatment and too little information on the performance of the plant at the time the samples were collected to use these data in evaluating the performance of various levels of treatment. The data reported in DMR's were used to compare the treatment performance of actual plants to the treatment effectiveness concentrations presented in Section VII. The statistical analysis is presented in the Administrative Record for this rulemaking.

WATER USE AND WASTEWATER CHARACTERISTICS

In the following discussion, water use, wastewater discharge, current .recycle practices, and analytical sampling data are presented for each waste stream by subcategory. These data were collected from the dcps and during field sampling. Appropriate tubing or background blank and source water concentrations are presented with the summaries of the sampling data. The method by which each sample was collected is indicated by number, as follows, unless otherwise indicated:

1 one-time grab
2 manual composite during intermittent process operation
3 8-hour manual composite
4 8-hour automatic composite
5 24-hour manual composite
6 24-hour automatic composite

To simplify the presentation of the sampling data, the actual analytical data are presented only for those pollutants detected in any sample of that wastewater stream. No analyses were performed on priority pollutants 89-113, unless otherwise indicated.

Figures V-1 through V-25 show the location of wastewater sampling sites at each facility.

As shown in Table V-1, not every waste stream generated by nonferrous metals forming operations was sampled during the screen and verification sampling programs. In order to evaluate the applicability of the various treatment technologies to non-sampled waste streams, the physical and chemical characteristics of these streams were extrapolated from similar sampled streams. This extrapolation was also necessary to estimate the costs of the various treatment technologies, as discussed in Section VIII. Extrapolation of sampling data from sampled to non-sampled waste streams was not used to select pollutants for regulation in this category (see Section VI).

In order to verify the assumption that physical and chemical characteristics for one process wastewater would be similar to another, the Agency asked 49 plants to submit analytical data on specific raw waste streams which had not been sampled during the screening and verification program. Twenty-four plants provided these data directly and 18 plants provided samples to be analyzed. Four plants responded that they were no longer forming the metal for which information was requested, or that their production schedule did not include the metal specified within the time frame of that request. Three plants reported that they did not actually generate the waste stream for which information was requested.

In all the Agency received analytical data for 41 waste streams for which we had not previously had any wastewater characteristics data. Most of these wastewater streams were relatively small volume streams, such as forming lubricants. These data were not used to select pollutants for regulation in this category (see Section VI) or to estimate the pollutant loading currently generated by the category. However, they were used to verify assumptions of wastewater characteristics. All data obtained through the plant self-sampling program may be found in the record supporting this rulemaking.

Waste streams generated by similar physical processes using similar process chemicals will have very similar physical and chemical characteristics. For example, water used to cool extrusions will have low concentrations of all pollutants. This is demonstrated by the results of the chemical analyses of lead and nickel extrusion press and solution heat treatment contact cooling water (Table V-4). The major difference between these two waste streams is that the concentration of lead is higher in the lead cooling water (0.13 mg/l vs. not detected) and the concentration of nickel is higher in the nickel cooling water (0.14 mg/l vs. 0.007 mg/l). This pattern will be repeated whenever water, without additives, is used to cool hot metal.

In contrast, spent rolling emulsions have high concentrations of several pollutants. The results of chemical analyses of lead, nickel, and precious metals rolling spent emulsions are presented in Table V-5. All three waste streams have high concentrations of oil and grease, total suspended and dissolved solids, and several metals. The lead rolling spent emulsion has a high concentration of lead (29.0 mg/l), the nickel rolling spent emulsion has high concentrations of nickel and chrome (8.95 mg/l and 1.27 mg/l, respectively), and the precious metals rolling spent emulsion has high concentrations of copper, silver, and zinc (25.0 mg/l, 0.13 mg/l, and 6.00 mg/l, respectively). It is not surprising to find chromium in nickel rolling spent emulsions and copper and zinc in precious metals rolling spent emulsions because chromium is a common alloy of nickel and copper and zinc are common alloys of precious metals. Thus, the major difference between the three waste streams is the presence of the metals formed in the operation generating the waste stream.

From the discussion above, it follows that lead-tin-bismuth, nickel-cobalt, and zinc drawing spent emulsions will have chemical characteristics similar to precious metals drawing spent emulsions. The major difference between the waste streams will be the concentration of the metal drawn. Similarly, magnesium, zinc, and refractory metals rolling spent emulsions will have chemical characteristics similar to lead, nickel, and precious metals rolling spent emulsions, except for the concentration of the metal rolled.

Arguments analogous to those presented above were used to estimate the physical and chemical characteristics of all non-sampled waste streams. These estimations, and summaries of analytical data, water use, wastewater discharge, and current recycle practices, are presented below.

Lead-Tin-Bismuth Forming Subcategory

<u>Lead-Tin-Bismuth Rolling Spent Emulsions</u>. As discussed in Section III, oil-in-water emulsions are used as coolants and lubricants. Rolling emulsions are typically recycled using in-line filtration and periodically batch discharged when spent. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-6.

Table V-7 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of rolling spent emulsions was collected at one plant. Elevated concentrations of lead (29 mg/l), zinc (1.4 mg/l), oil and grease (270 mg/l), and TSS (480 mg/l) were detected in the sample.

Lead-Tin-Bismuth Rolling Spent Soap Solutions. As discussed in Section III, soap solutions can be used as lubricants and coolants in rolling. Of the plants surveyed, only one plant reported the use of soap solutions in rolling. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-8.

To estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to rolling spent emulsions in this subcategory. Spent soap solutions and spent emulsions are both used as lubricants and coolants in rolling. Therefore, the pollutants present and the mass loadings of pollutants present in rolling spent soap solutions and rolling spent emulsions were expected to be similar. However, spent soap solutions were expected to have an oil and grease mass loading similar to alkaline cleaning rinsewater. Spent soap solutions contain the same process chemicals as alkaline cleaning baths and so were expected to have oil and grease loadings similar to the loadings carried out in alkaline cleaning rinsewater.

Lead-Tin-Bismuth Drawing Spent Neat Oils. As discussed in Section III, oil-based lubricants may be used in drawing operations to ensure uniform drawing temperatures and avoid excessive wear on dies and mandrels. Drawing oils are usually recycled until their lubricant properties are exhausted and are then contract hauled. Water use, wastewater discharge, and current recycle operations corresponding to this waste stream are summarized in Table V-9.

Since none of the plants surveyed reported discharging the spent neat oils, no samples were collected.

Lead-Tin-Bismuth Drawing Spent Emulsions. As discussed in Section III, oil-water emulsions can be used as drawing lubricants. The drawing emulsions are frequently recycled and batch discharged periodically after their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-10.

No samples of drawing spent emulsions were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to rolling spent emulsions in this subcategory. These two waste streams are generated from similar physical processes which use similar process chemicals.

Therefore, the pollutants present in each waste stream and the mass loading (mg/kkg product) at which they are present should be similar.

Lead-Tin-Bismuth Drawing Spent Soap Solutions. As discussed in Section III, soap solutions can be used as drawing lubricants. The drawing soap solutions are frequently recycled and batch discharged periodically after their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-11.

Table V-12 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of drawing spent soap solutions was collected at one plant. Elevated concentrations of antimony (21 mg/l), lead (3,100 mg/l), zinc (230 mg/l), tin 1,600 mg/l), oil and grease (353,000 mg/l) and TSS (294,000 mg/l) were detected in the sample.

Lead-Tin-Bismuth Extrusion Press and Solution Heat Treatment Contact Cooling Water. As discussed in Section III, heat treatment of lead-tin-bismuth products frequently involves the use of a water quench in order to achieve desired metallic properties. Fourteen plants reported 17 extrusion press and solution heat treatment processes that involve water quenching either by spraying water on the metal as it emerges from the die or press or by direct quenching into a contact water bath. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-13.

Table V-14 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of extrusion press and solution heat treatment contact cooling water was collected at one plant. An elevated concentration of chromium (4.6 mg/l) was detected in the sample.

Lead-Tin-Bismuth Extrusion Press Hydraulic Fluid Leakage. As discussed in Section III, due to the large force applied by a hydraulic extrusion press, hydraulic fluid leakage is unavoidable. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-15.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to press hydraulic fluid leakage in the nickel-cobalt subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Lead-Tin-Bismuth Swaging Spent Emulsions. As discussed in Section III, oil-water emulsions can be used as swaging lubricants. The swaging emulsions are frequently recycled and batch discharged periodically after their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-16.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to rolling spent emulsions in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Lead-Tin-Bismuth Continuous Strip Casting Contact Cooling Water. As discussed in Section III, in continuous casting, no restrictions are placed on the length of the casting and it is not necessary to interrupt production to remove the cast product. Although the use of continuous casting techniques has been found to significantly reduce or eliminate the use of contact cooling water and oil lubricants, five plants reported the use of continuous strip contact cooling water. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-17.

Table V-18 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of continuous strip casting contact cooling water was collected at one plant. Elevated concentrations of lead (1.2 mg/l) and zinc (3.1 mg/l) were detected in the sample.

Lead-Tin-Bismuth Semi-Continuous Ingot Casting Contact Cooling Water. As discussed in Section III, semi-continuous ingot casting may require the use of contact cooling water in order to achieve the desired physical properties of the metal. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-19.

Table V-20 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of semi-continuous ingot casting contact cooling water were collected from one stream at one plant. Elevated concentrations of lead (1.10 mg/l) and TSS (80 mg/l) were detected in the samples.

Lead-Tin-Bismuth Shot Casting Contact Cooling Water. As discussed in Section III, contact cooling water is required to cool the cast lead shot so that it will not reconsolidate as well as to achieve the desired metallic properties. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-21.

Table V-22 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of shot casting contact cooling water were collected from one stream at one plant. Elevated concentrations of lead (52.2 mg/l), antimony (3.30 mg/l), tin (10.5 mg/l), oil and grease (22 mg/l), and TSS (420 mg/l) were detected in the samples.

Lead-Tin-Bismuth Shot Forming Wet Air Pollution Control Blowdown. As discussed in Section III, shot forming may require wet air pollution control in order to meet air quality standards. Of the plants surveyed, only one reported the use of wet air pollution control on a shot forming operation. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-23.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to shot casting contact cooling water in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Lead-Tin-Bismuth Alkaline Cleaning Spent Baths. As discussed in Section III, alkaline cleaning is commonly used to clean lead, tin, and bismuth surfaces. Products can be cleaned with an alkaline solution either by immersion or spray. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-24.

Table V-25 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of an alkaline cleaning spent bath was collected at one plant. Elevated concentrations of lead (183 mg/l), antimony (7.30 mg/l), oil and grease (600 mg/l), and TSS (560 mg/l) were detected in the sample.

Lead-Tin-Bismuth Alkaline Cleaning Rinse. As discussed in Section III, rinsing, usually with warm water, generally follows the alkaline cleaning process to prevent the solution from drying on the product. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-26.

Table V-27 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Four samples of alkaline cleaning rinsewater were collected from two streams at one plant. Elevated concentrations of lead (40.8 mg/l), antimony (1.10 mg/l), and TSS (260 mg/l) were detected in the samples.

Lead-Tin-Bismuth Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

Lead-Tin-Bismuth Operations Which Do Not Use Process Water. The Agency has established no discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater either because they are dry or because they use noncontact cooling water only:

Continuous Wheel Casting
Continuous Sheet Casting
Stationary Casting
Shot Pressing
Forging
Stamping
Pointing
Punching
Shot Blasting
Slug Forming
Powder Metallurgy Operations (Pressing, Sintering, Sizing)
Powder Tumbling
Melting
Solder Cream Making
Annealing
Tumble Cleaning
Slitting
Sawing
Coiling, Spooling
Trimming.

Magnesium Forming Subcategory

Magnesium Rolling Spent Emulsions. As discussed in Section III, oil-water emulsions are used in rolling operations as coolants and lubricants. Rolling emulsions are typically recycled using in-line filtration treatment. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-28.

Since none of the plants surveyed reported discharging the rolling spent emulsions, no samples of this waste stream were collected.

Magnesium Forging Spent Lubricants. As discussed in Section III, either water, oil, or granulated carbon can be applied to forging dies for proper lubrication. Water use, wastewater characteristics, and current recycle practices corresponding to this waste stream are summarized in Table V-29.

Since none of the plants surveyed reported discharging the forging spent lubricants, no samples of this waste stream were collected.

Magnesium Forging Contact Cooling Water. As discussed in Section III, forging dies and ring roller parts and tooling may require cooling to maintain the proper die temperature between forgings or rolling, or to cool the forging dies prior to removal from the forge hammer. The contact cooling water may also be used as a heat treatment to improve mechanical properties of the metal being forged. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-30.

No samples of forging contact cooling water were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to extrusion press and solution heat treatment contact cooling water in the lead-tin-bismuth subcategory. These two waste streams are generated by using water, without additives, to cool hot metal. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of magnesium in magnesium forming solution heat treatment contact cooling water should be similar to the mass loading of lead in lead-tin-bismuth extrusion press and solution heat treatment contact cooling water, and vice versa. Also, there should be no significant mass loading of antimony in magnesium forming solution heat treatment contact cooling water because magnesium is not commonly alloyed with antimony. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

<u>Magnesium Forging Equipment Cleaning Wastewater</u>. As discussed in Section III, forging equipment may be periodically cleaned in order to prevent the excessive buildup of oil, grease, and caked-on solid lubricants on the forging die. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-31.

No samples of forging equipment cleaning wastewater were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to alkaline cleaning rinsewater in the lead-tin-bismuth subcategory. These two waste streams are generated by cleaning operations which use similar process chemicals. Since granulated coal and graphite suspensions are frequently used to lubricate magnesium forging operations, magnesium forging equipment cleaning wastewater may contain higher mass loadings of total suspended solids. In addition, the metals present in the two waste streams should differ. The mass loading (mg/kkg) of magnesium in magnesium forging equipment cleaning wastewater should be similar to the mass loading of lead in lead-tin-bismuth alkaline cleaning rinsewater, and vice versa. Also, there should be no significant concentration of antimony in magnesium forging equipment cleaning wastewater because magnesium is not commonly alloyed with antimony. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

<u>Magnesium Direct Chill Casting Contact Cooling Water</u>. As discussed in Section III, contact cooling water is a necessary part

of direct chill casting. The cooling water may be contaminated by lubricants applied to the mold before and during the casting process. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-32.

The one nonferrous metals forming plant reporting the use of direct chill casting contact cooling water discharges no water, therefore, no samples of this waste stream were collected.

Magnesium Surface Treatment Spent Baths. As discussed in Section III, a number of chemical treatments may be applied after the forming of magnesium products. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-33.

Table V-34 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of surface treatment spent baths were collected from three streams at one plant. Elevated concentrations of magnesium (9,150 mg/l), chromium (28,000 mg/l), zinc (89.0 mg/l), aluminum (64 mg/l), ammonia (97 mg/l), oil and grease (47,000 mg/l), and TSS (160 mg/l) were detected in the samples.

Magnesium Surface Treatment Rinse. As discussed in Section III, rinsing follows the surface treatment process to prevent the solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-35.

Table V-36 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Twelve samples of surface treatment rinsewater were collected from eight streams at one plant. Elevated concentrations of magnesium (148 mg/l), zinc (2.1 mg/l), chromium (516 mg/l), ammonia (81 mg/l), oil and grease (16 mg/l), and TSS (97 mg/l) were detected in the samples.

Magnesium Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require lubrication with an oil-water emulsion in order to minimize friction and to dissipate excess heat from the metal and cutting tool. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-37.

Since none of the plants surveyed reported discharging the sawing or grinding spent emulsions, no samples of this waste stream were collected.

Magnesium Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

Magnesium Wet Air Pollution Control Blowdown. As discussed in Section III, wet air pollution control devices are needed to control air pollution from some operations. For instance, scrubbers are frequently necessary over sanding and repairing operations where particulates are a problem or scrubbers may be necessary when particulates and smoke are generated from the partial combustion of oil-based lubricants as they contact the hot forging dies. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-38.

Table V-39 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of extrusion press hydraulic fluid was collected at one plant. Elevated concentrations of lead (0.877 mg/l), aluminum (1.1 mg/l), and magnesium (7.51 mg/l) were detected in the sample.

Magnesium Operations Which Do Not Use Process Water. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, because they use only noncontact cooling water or because they use no water at all:

Extrusion
Shot Blasting
Powder Atomization
Screening
Turning.

Nickel-Cobalt Forming Subcategory

Nickel-Cobalt Rolling Spent Neat Oils. As described in Section III, cold rolling of nickel-cobalt products may require the use of mineral oil lubricants. The oils are usually recycled with in-line filtration and periodically disposed of by sale to an oil reclaimer or by incineration. Because discharge of this stream is not practiced, limited flow data were available for analysis. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-40.

Since none of the plants surveyed reported discharging the rolling spent neat oils, no samples of this waste stream were collected.

Nickel-Cobalt Rolling Spent Emulsions. As discussed in Section III, oil-water emulsions are used in rolling operations as coolants and lubricants. Rolling emulsions are typically recycled using in-line filtration with periodic batch discharge of the spent emulsion. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-41.

Table V-42 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Four samples of rolling spent emulsions were collected from two streams at two plants. Elevated concentrations of nickel (34.2 mg/l), zinc (6.70 mg/l), oil and grease (7,600 mg/l), and TSS (6,800 mg/l) were detected in the samples.

Nickel-Cobalt Rolling Contact Cooling Water. As discussed in Section III, it is necessary to use contact cooling water during rolling to prevent excessive wear on the rolls, to prevent adhesion of metal to the rolls, and to maintain a suitable and uniform rolling temperature. Water is one type of lubricant-coolant which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-43.

Table V-44 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Eight samples of rolling contact cooling water were collected from four streams at two plants. Elevated concentrations of nickel (9.4 mg/l), copper (0.78 mg/l), oil and grease (300 mg/l), and TSS (350 mg/l) were detected in the samples.

Nickel-Cobalt Tube Reducing Spent Lubricants. As discussed in Section III, tube reducing, much like rolling, may require a lubricating compound in order to prevent excessive wear of the tube reducing rolls, prevent adhesion of metal to the rolls, and to maintain a suitable and uniform tube reducing temperature. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-45.

Table V-46 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of tube reducing spent lubricants was collected from one stream at one plant. Elevated concentrations of nickel (58.0 mg/l), copper (43.5 mg/l), lead (47.6 mg/l), zinc (63.1 mg/l), and oil and grease (200,000 mg/l) were detected in the sample. In addition, the sample had elevated concentrations of the toxic organics 1,1,1-trichloroethane (33 mg/l) and N-nitrosodiphenylamine (28.2 mg/l).

Nickel-Cobalt Drawing Spent Neat Oils. As discussed in Section III, oil-based lubricants may be required in draws which have a high reduction in diameter. Drawing oils are usually recycled, with in-line filtration, until their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-47.

Since none of the plants surveyed reported currently discharging the drawing spent neat oils, no samples were collected.

Nickel-Cobalt Drawing Spent Emulsions. As discussed in Section III, oil-water emulsions are often used as coolants and lubricants in drawing. The drawing emulsions are frequently recycled and batch discharged periodically after their lubricant properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-48.

Table V-49 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of drawing spent emulsions was collected at one plant. Elevated concentrations of copper (50 mg/l), nickel (3.0 mg/l), zinc (2.6 mg/l), iron (17.0 mg/l), oil and grease (2,490 mg/l) and TSS (1,300 mg/l) were detected in this sample.

Nickel-Cobalt Extrusion Spent Lubricants. As discussed in Section III, the extrusion process requires the use of a lubricant to prevent adhesion of the metal to the die and ingot container walls. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-50.

Since none of the plants surveyed reported wastewater discharging extrusion spent lubricants, no samples of this waste stream were collected.

Nickel-Cobalt Extrusion Press and Solution Heat Treatment Contact Cooling Water. As discussed in Section III, heat treatment is frequently used after extrusion to attain the desired mechanical properties in the extruded metal. Contact cooling of the extrusion, sometimes called press heat treatment, can be accomplished with a water spray near the die or by immersion in a water tank adjacent to the runout table. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-51.

Table V-52 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of extrusion press heat treatment contact cooling water was collected at one plant. An elevated concentration of chromium (0.130 mg/l) was detected in the sample.

Nickel-Cobalt Extrusion Press Hydraulic Fluid Leakage. As discussed in Section III, due to the large force applied by a hydraulic press, some hydraulic fluid leakage is unavoidable. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-53.

Table V-54 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of extrusion press hydraulic fluid leakage were collected at one plant. Elevated concentrations of copper (0.75 mg/l), nickel (1.30 mg/l), oil and grease (420 mg/l), and TSS (250 mg/l) were detected in the samples.

Nickel-Cobalt Forging Spent Lubricants. As discussed in Section III, either water, oil, or granulated carbon can be applied to forging dies for proper lubrication. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-55.

Since none of the plants surveyed reported discharging the forging spent lubricants, no samples of this waste stream were collected.

Nickel-Cobalt Forging Contact Cooling Water. As discussed in Section III, forging dies may require cooling to maintain the proper die temperature between forgings, or to cool the dies prior to removal from the forge hammer. The contact cooling water may also be used as a heat treatment to improve mechanical properties of the metal being forged. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-56.

Table V-57 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of forging contact cooling water were collected at two plants. Elevated concentrations of copper (3.4 mg/l), nickel (16 mg/l), and TSS (1,800 mg/l) were detected in the samples.

Nickel-Cobalt Forging Equipment Cleaning Wastewater. Forging equipment may be periodically cleaned in order to prevent the excessive buildup of oil and grease on the forging die. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-58.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to forging contact cooling water in this subcategory. These two waste stream are generated from similar physical processes (flushing a forging or forging die with water), so the pollutants present are expected to be similar. However, the water is used for different purposes, in one case to cool a hot forging or forging die, in the other, to remove built-up contaminants. Therefore, the mass loadings of oil and grease are expected to be higher in forging equipment cleaning wastewater than in forging contact cooling water. After proposal, these assumptions were confirmed by plant self-sampling data.

Nickel-Cobalt Forging Press Hydraulic Fluid Leakage. As discussed in Section III, due to the large force applied by a hydraulic press, some hydraulic fluid leakage is unavoidable. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-59.

Table V-60 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of forging press hydraulic fluid leakage was collected at one plant. Elevated concentrations of nickel (0.64 mg/l), oil and grease (17 mg/l), and TSS (500 mg/l) were detected in the sample.

Nickel-Cobalt Metal Powder Production Atomization Wastewater. As discussed in Section III, metal powder is commonly produced through wet atomization of a molten metal. Of the plants surveyed, three reported the use of water in the atomization of molten nickel. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-61.

Table V-62 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Seven samples of metal powder production wet atomization wastewater were collected at three plants. Elevated concentrations of chromium (54.9 mg/l), copper (45.0 mg/l), nickel (210.0 mg/l), iron (10.3 mg/l), and TSS (317 mg/l) were detected in the samples.

Nickel-Cobalt Stationary Casting Contact Cooling Water. As discussed in Section III, contact cooling water is sometimes used in stationary casting. The cooling water may be contaminated by lubricants applied to the mold before and during the casting process and by the cast metal itself. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-63.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to rolling contact cooling water in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Nickel-Cobalt Vacuum Melting Steam Condensate. As discussed in Section III, nickel-cobalt may be melted by an operation known as vacuum melting. The high pressure steam used to create the vacuum condenses to an extent as it produces the vacuum. Although this water does not come in contact with the metal product, it may potentially be contaminated with metal fines or components of lubricant compounds volatilized in the furnace if scrap is being melted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-64.

Table V-65 summarizes the analytical sampling data for priority

and selected conventional and nonconventional pollutants. One sample of vacuum melting steam condensate was collected at one plant. No pollutants were detected in the sample at above treatable concentrations.

Nickel-Cobalt Annealing and Solution Heat Treatment Contact Cooling Water. As discussed in Section III, solution heat treatment is implemented after annealing operations to improve mechanical properties by maximizing the concentration of hardening contaminants in the solid metal solution. Solution heat treatment typically involves significant quantities of contact cooling water. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-66.

Table V-67 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of solution heat treatment contact cooling water were collected from two streams at two plants. Elevated concentrations of nickel (6.80 mg/l), copper (2.92 mg/l), oil and grease (40 mg/l), and TSS (78 mg/l) were detected in the samples.

Nickel-Cobalt Surface Treatment Spent Baths. As discussed in Section III, a number of chemical surface treatments may be applied after the forming of nickel-cobalt products. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-68.

Table V-69 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Samples of four spent surface treatment baths were collected at two plants. Very high concentrations of nickel (193,000 mg/l), copper (4,800 mg/l), cobalt (4,000 mg/l), chromium (3,600 mg/l), fluoride (94,000 mg/l), and TSS (5,800 mg/l) were detected in the samples.

Nickel-Cobalt Surface Treatment Rinsewater. As discussed in Section III, rinsing follows the surface treatment process to prevent the surface treatment solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-70.

Table V-71 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Twenty-five samples of surface treatment rinsewater were collected from nine streams at four plants. Elevated concentrations of nickel (364 mg/l), copper (87.4 mg/l), chromium (18.8 mg/l), cobalt (4.0 mg/l), zinc (2.36 mg/l), fluoride (250 mg/l), titanium (48.0 mg/l), oil and grease (130 mg/l), and TSS (760 mg/l) were detected in the samples.

Nickel-Cobalt Ammonia Rinse. As discussed in Section III, an ammonia rinse may be used after acid pickling of nickel-cobalt products to neutralize the acid prior to further rinsing. The ammonia rinse is periodically batch discharged when spent. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-72.

Table V-73 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of ammonia rinse wastewater was collected at one plant. Elevated concentrations of nickel (456 mg/l), copper (54.0 mg/l), chromium (108 mg/l), zinc (32.0 mg/l), and TSS (9,000 mg/l) were detected in the sample.

Nickel-Cobalt Alkaline Cleaning Spent Baths. As discussed in Section III, alkaline cleaners are formulations of alkaline salts, water, and surfactants. Spent solutions are discharged from alkaline cleaning processes. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-74.

Table V-75 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Four samples of alkaline cleaning spent baths were collected from four streams at two plants. Elevated concentrations of nickel (122 mg/l), copper (39.2 mg/l), zinc (3.90 mg/l), chromium (38.0 mg/l), oil and grease (170 mg/l), and TSS (4,000 mg/l) were detected in the samples.

Nickel-Cobalt Alkaline Cleaning Rinse. As discussed in Section III, metal parts are usually rinsed following alkaline cleaning to remove the cleaning solution and any solubilized contaminants. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-76.

Table V-77 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Five samples of alkaline cleaning rinsewater were collected from four streams at two plants. Elevated concentrations of nickel (5.58 mg/l), oil and grease (26 mg/l), and TSS (190 mg/l) were detected in the samples.

Nickel-Cobalt Molten Salt Rinse. As discussed in Section III, when molten salt baths are used to descale nickel and cobalt alloys, they are generally followed by a water quench and rinse step. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-78.

Table V-79 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Eight samples of molten salt rinsewater were collected from four streams at four plants. Elevated concentrations of nickel (54.0 mg/l), copper (8.05 mg/l), cobalt (2.8 mg/l), chromium (1,100 mg/l), and TSS (4,200 mg/l) were detected in the samples.

Nickel-Cobalt Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require lubrication with an oil-water emulsion in order to minimize friction and to dissipate excess heat from the metal and cutting tool. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-80.

Table V-81 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Twelve samples of sawing or grinding spent lubricants were collected from 12 streams at three plants. Elevated concentrations of nickel (116 mg/l), copper (16.5 mg/l), cobalt (3.4 mg/l), chromium (24.0 mg/l), oil and grease (16,000 mg/l), and TSS (2,440 mg/l) were detected in the samples.

Nickel-Cobalt Sawing or Grinding Rinse. As discussed in Section III, a rinsing step may be used following sawing or grinding to remove lubricants dragged out on the product and to wash away sawing or grinding swarf. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-82.

No samples of sawing or grinding rinsewater were collected during the sampling program. However, to estimate pollutant loads for this program, the Agency assumed that this stream would have wastewater characteristics similar to sawing or grinding rinsewater in the zirconium-hafnium subcategory. Because sawing or grinding rinsing operations are similar among subcategories, the pollutants present and the mass loadings of pollutants present are expected to be similar with respect to the major metal formed. That is, the mass loading of nickel and zirconium in nickel sawing or grinding rinsewater is expected to be similar to the mass loading of zirconium and nickel, respectively, in zirconium sawing or grinding rinsewater. Since no process chemicals are added to the rinsewater, mass loadings of all other pollutants are expected to be similar.

Nickel-Cobalt Steam Cleaning Condensate. As discussed in Section III, steam cleaning may be used to remove oil and grease from the surface of metal. Steam is condensed to water as it contacts the surface of the relatively cooler metal. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-83.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to rolling contact cooling water in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Nickel-Cobalt Hydrostatic Tube Testing and Ultrasonic Testing Wastewater. As discussed in Section III, hydrostatic tube testing and ultrasonic testing operations are used to determine the integrity of tubes and to check metal parts for subsurface imperfections. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-84.

No samples of hydrostatic tube testing and ultrasonic testing wastewater were collected during the sampling program. However, the Agency assumed that this stream would have wastewater characteristics similar to rolling contact cooling water in this subcategory. These two waste streams are generated in processes in which water, without any added process chemicals, contacts metal. Therefore, the pollutants present in each waste stream and the mass loading (mg/kkg) at which they are present should be similar.

Nickel-Cobalt Dye Penetrant Testing Wastewater. As discussed in Section III, testing operations are used to check nonferrous metals parts for discontinuities that are open to the surface in the part being tested. Dye penetrant testing operations are sources of wastewater because the parts must be rinsed following penetration of the dye so that, upon inspection, dye will only remain in the discontinuities. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-85.

Table V-86 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Two samples of dye penetrant testing wastewater were collected at two plants.

Nickel-Cobalt Miscellaneous Wastewater Sources. Several low volume sources of wastewater were reported on the dcp and observed during the site and sampling visits. These sources include maintenance and cleanup. The Agency has determined that none of the plants reporting these specific water uses discharge these wastewaters to surface water (directly or indirectly). However, because the Agency believes that this type of low volume periodic discharge occurs at most plants, the Agency is including an allowance for the miscellaneous wastewater sources.

Nickel-Cobalt Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging the spent degreasing solvents, no samples were collected.

Nickel-Cobalt Wet Air Pollution Control Blowdown. As discussed in Section III, wet air pollution control devices are required to control air pollution from some operations. Scrubbers are frequently necessary over surface treatment operations to control fumes and over shot blasting operations to control particulates. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-87.

Table V-88 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of wet air pollution control blowdown were collected. Blowdown from a scrubber on a surface treatment operation was sampled at two plants and on a shot blasting operation at another plant. Elevated concentrations of nickel, copper (2.85 mg/l), chromium and TSS (190 mg/l) were detected in the samples.

Nickel-Cobalt Electrocoating Rinse. As discussed in Section III, products are usually rinsed following electrocoating before they are subsequently formed. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-89.

No samples of electrocoating rinsewater were collected during the sampling program. However, one commenter provided sufficient information to calculate the mass loadings for three pollutants. Elevated concentrations of nickel (53.2 mg/l), chromium (1.22 mg/l), and copper (34.2 mg/l) were reported. The calculated mass loadings are 179,000 mg/kkg of nickel, 4,110 mg/kkg of chromium, and 115,000 mg/kkg of copper. The loadings of other pollutants are expected to be similar to the loadings for alkaline cleaning rinsewater.

Nickel-Cobalt Operations Which Do Not Use Process Water. The Agency has established no discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, either because they are dry or because they use noncontact cooling water only:

Powder Metallurgy Operations (Compacting, Sintering, Sizing)
Powder Blending
Powder Ball Milling
Powder Attrition
Powder Extrusion
Hot Isostatic Pressing
Grit, Sand and Shot Blasting
Welding
Plasma Torch Cutting
Gas Cleaning
Coil Buildup, Coiling
Straightening
Electroflux Remelting.

Precious Metals Forming Subcategory

Precious Metals Rolling Spent Neat Oils. As discussed in Section III, the rolling of precious metals products may require the use of mineral oil lubricants. The oils are usually recycled with in-line filtration and periodically disposed of by sale to an oil reclaimer or by incineration. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-90.

Since none of the plants surveyed reported discharging the rolling spent neat oils, no samples of this waste stream were collected.

Precious Metals Rolling Spent Emulsions. As discussed in Section III, oil-water emulsions are used in rolling operations as coolants and lubricants. Rolling emulsions are typically recycled using in-line filtration with periodic batch discharge of the recycled emulsion as it loses its lubricating properties. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-91.

Table V-92 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of rolling spent emulsion were collected from three streams at two plants. Elevated concentrations of copper (25.0 mg/l), zinc (6.00 mg/l), silver (0.130 mg/l), oil and grease (1,500 mg/l), and TSS (500 mg/l) were detected in the samples.

Precious Metals Drawing Spent Neat Oils. As discussed in Section III, oil-based lubricants may be required in draws which have a high reduction in diameter. Drawing oils are usually recycled until their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-93.

Since none of the plants surveyed reported discharging the drawing spent neat oils, no samples were collected.

Precious Metals Drawing Spent Emulsions. As discussed in Section III, oil-water emulsions may be used as coolants and lubricants in drawing. The drawing emulsions are frequently recycled and batch discharged periodically after their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-94.

Table V-95 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of drawing spent emulsions was collected at one plant. Elevated concentrations of copper (46.4 mg/l), zinc (5.18 mg/l), lead (1.05 mg/l), and oil and grease (33,000 mg/l) were detected in the sample.

Precious Metals Drawing Spent Soap Solutions. As discussed in Section III, soap solutions can be used as drawing lubricants.

The drawing soap solutions may be recycled and batch discharged periodically after their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-96.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to rolling spent emulsions in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Precious Metals Metal Powder Production Atomization Wastewater. As discussed in Section III, metal powder is commonly produced through wet atomization of a molten metal. Water is removed after the atomization step, commonly by settling, then discharged. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-97.

No samples of metal powder production atomization wastewater were collected during the sampling program. However, the Agency believes that this stream will have wastewater characteristics similar to shot casting contact cooling water in this subcategory. These two waste streams are generated by using water to cool molten metal. Therefore, the pollutants present in each waste stream and the mass loading (mg/kkg) at which they are present should be similar.

Precious Metals Direct Chill Casting Contact Cooling Water. As discussed in Section III, contact cooling water is a necessary part of direct chill casting. The cooling water may be contaminated by lubricants applied to the mold before and during the casting process. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-98.

Precious Metals Shot Casting Contact Cooling Water. As discussed in Section III, during shot casting, a tank of contact cooling water, either stagnant or circulating, is necessary for quick quenching of cast shot. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-99.

Table V-100 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of shot casting contact cooling water were collected from one stream at one plant. Elevated concentrations of cadmium (9.88 mg/l), copper (0.600 mg/l), zinc (5.66 mg/l), and oil and grease (54 mg/l) were detected in the samples.

Precious Metals Stationary Casting Contact Cooling Water. As discussed in Section III, stationary casting of metal ingots is practiced at many nonferrous metals forming plants. Lubricants and cooling water are usually not required, however, two of the plants surveyed reported the use and discharge of stationary casting contact cooling water. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-101.

No samples of stationary casting contact cooling water were collected during the sampling program. However, the Agency assumed that this stream would have wastewater characteristics similar to semi-continuous and continuous casting contact cooling water in this subcategory. These two waste streams are generated by using water, without additives, to cool hot metal. Therefore, the pollutants present in each waste stream and the mass loading at which they are present should be similar.

Precious Metals Semi-Continuous and Continuous Casting Contact Cooling Water. As discussed in Section III, a number of different continuous casting processes are currently being used in the precious metals industry. The use of continuous casting techniques has been found to significantly reduce or eliminate the use of contact cooling water and oil lubricants. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-102.

Table V-103 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of semi-continuous and continuous casting contact cooling water were collected from two streams at two plants. Elevated concentrations of copper, cyanide (0.50 mg/l), oil and grease and TSS were detected in the samples.

Precious Metals Heat Treatment Contact Cooling Water. As discussed in Section III, contact cooling water is used to obtain a controlled cooling rate following solution heat treatment and annealing. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-104.

Precious Metals Surface Treatment Spent Baths. As discussed in Section III, a number of chemical treatments may be applied after the forming of precious metals products. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-105.

Precious Metals Surface Treatment Rinse. As discussed in Section III, rinsing follows the surface treatment process to prevent the solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-106.

Table V-107 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Seven samples of surface treatment rinsewater were collected from four streams at three plants. Elevated concentrations of cadmium (11.1 mg/l), copper (60.6 mg/l), silver (6.70 mg/l), zinc and TSS

(3,000 mg/l) were detected in the samples.

Precious Metals Alkaline Cleaning Spent Baths. As discussed in Section III, alkaline cleaners are formulations of alkaline salts, water, and surfactants. Spent solutions are discharged from alkaline cleaning processes after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-108.

Precious Metals Alkaline Cleaning Rinse. As discussed in Section III, following alkaline treating, metal parts are rinsed. Rinses are discharged from alkaline cleaning processes. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-109.

No samples of alkaline cleaning rinsewater were collected during the sampling program. However, the Agency assumed that this stream would have wastewater characteristics similar to alkaline cleaning rinsewater in the nickel-cobalt subcategory. These two waste streams are generated by identical physical processes which use similar process chemicals. The only difference should be the metals present. The mass loading of precious metals in precious metals alkaline cleaning rinsewater should be similar to the mass loading of nickel in nickel alkaline cleaning rinsewater, and vice versa. Also, chromium should not be present in significant amounts. The other pollutants present in each waste stream, and the mass loading at which they are present, should be similar.

Precious Metals Alkaline Cleaning Prebonding Wastewater. As discussed in Section III, prior to bonding (cladding), metal surfaces must be cleaned in order to obtain a good bond. The main source of process water in metal cladding operations is in cleaning the metal surfaces prior to bonding. Acid, caustic, or detergent cleaning can be performed depending on the metal type. For small batch operations, the cleaning steps can involve dipping the metal into small cleaning bath tanks and hand rinsing the metal in a sink. For larger continuous operations, the metal may be cleaned in a power scrubline. In a typical scrubline, the strip passes through a detergent bath, spray rinse, acid bath, spray rinse, rotating abrasive scrub brushes, and a final rinse. The metal may then pass through a heated drying chamber or may air dry. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-110.

Table V-111 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Eight samples of prebonding cleaning wastewater were collected from three streams at two plants. Elevated concentrations of silver (0.100 mg/l), zinc (2.32 mg/l), copper (5.95 mg/l), cyanide (0.28 mg/l), nickel (3.60 mg/l), oil and grease (16 mg/l), and TSS (400 mg/l) were detected in the samples.

Precious Metals Tumbling or Burnishing Wastewater. As discussed in Section III, tumbling is a controlled method of processing parts to remove burrs, scale, flash, and oxides as well as to improve surface finish of formed metal parts. Burnishing is the process of finish sizing or smooth finishing a workpiece (previously machined or ground) by displacement rather than removal, of minute surface irregularities. Water is used to facilitate tumbling and burnishing. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-112.

Table V-113 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Four samples of tumbling wastewater were collected from two streams at two plants. Elevated concentrations of silver (0.220 mg/l), lead (1.85 mg/l), zinc (3.16 mg/l), iron (7,850 mg/l), copper (142 mg/l), nickel (3.25 mg/l), chromium (3.18 mg/l), oil and grease (40 mg/l), and TSS (110 mg/l) were detected in the samples.

Precious Metals Sawing or Grinding Spent Neat Oils. As discussed in Section III, sawing or grinding operations may use mineral-based oils or heavy grease as the lubricant required to minimize friction and act as a coolant. Normally, cutting oils are not discharged as a wastewater stream. Water use, wastewater dis charge, and current recycle practices corresponding to this waste stream are summarized in Table V-114.

Since none of the plants surveyed reported discharging the sawing or grinding spent neat oils, no samples were collected.

Precious Metals Sawing or Grinding Spent Emulsions. As discussed in Section III, the rolls used in rolling operations obtain surface abrasions after repeated use. The rolls must be surface ground in order to obtain a smooth rolling surface. The rolled product will not be formed properly if the rolls are not adequately smooth. Roll grinding and other sawing and grinding operations generally require a lubricant to minimize friction and act as a coolant. Oil-water emulsions are commonly used for this purpose. The emulsions are typically recycled using in-line filtration and batch discharged periodically after their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-115.

Table V-116 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. A sample of roll grinding spent emulsions was collected at one plant. Elevated concentrations of zinc (0.920 mg/l), chromium (0.240 mg/l), and oil and grease (500 mg/l) were detected in the sample.

Precious Metals Pressure Bonding Contact Cooling Water. As discussed in Section III, metals can be bonded together through the use of pressure applied onto the desired forms. Cooling water may be applied after the bonding operation to facilitate handling of the bonded product. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-117.

Table V-118 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of pressure bonding contact cooling water was collected at one plant. Elevated concentrations of zinc (3.42 mg/l) and copper (7.85 mg/l) were detected in the sample.

<u>Precious Metals Degreasing Spent Solvents</u>. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

<u>Precious Metals Wet Air Pollution Control Blowdown</u>. As discussed in Section III, wet air pollution control devices are needed to control air pollution from some operations. For instance, scrubbers may be required over casting operations. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-119.

No samples of wet air pollution control blowdown were collected during the sampling program. However, the Agency assumed that this stream would have wastewater characteristics similar to shot casting contact cooling water in this subcategory. The pollutants in each of these waste streams derive from the contact of the water with particles of metal, so the pollutants present are expected to be similar. However, because the air pollution control device is designed to capture small particles and gases (dust and fumes) generated during the casting process, the mass loadings of total suspended solids and total dissolved solids are expected to be higher in wet air pollution control blowdown than in shot casting contact cooling water.

<u>Precious Metals Operations Which Do Not Use Process Water</u>. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, either because they use only noncontact cooling water or because they use no water at all:

Forging, Swaging
Punching, Stamping
Welding
Soldering
Melting
Screening
Sawing
Slitting
Metal Powder Production.

Refractory Metals Forming Subcategory

Refractory Metals Rolling Spent Neat Oils and Graphite-Based Lubricants. As discussed in Section III, the rolling of refractory metal products typically requires the use of mineral oil or graphite-based lubricants. The oils are usually recycled with in-line filtration and periodically disposed of by sale to an oil reclaimer or by incineration. Because discharge of this stream is not practiced, flow data were not available for analysis. Only one plant surveyed reported using neat oil rolling lubricants, but this plant did not report the quantity of lubricant used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-120.

Since none of the plants surveyed reported discharging the rolling spent neat oils or graphite-based lubricants, no samples were collected.

Refractory Metals Rolling Spent Emulsions. As discussed in Section III, oil-water emulsions are used in rolling operations as coolants and lubricants. Rolling emulsions are typically recycled with in-line filtration and batch discharged periodically when the lubricating properties of the emulsions are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-121.

No samples of rolling spent emulsions were collected during the sampling program. However, the Agency assumed that this stream would have wastewater characteristics similar to nickel-cobalt rolling spent emulsions. These two waste streams are generated by identical physical processes which use similar process chemicals. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of refractory metals rolling spent emulsions should be similar to the mass loading of nickel in nickel rolling spent emulsions, and vice versa. In addition, the mass loading of chromium in refractory metals rolling spent emulsions should be insignificant because refractory metals are seldom alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

Refractory Metals Drawing Spent Lubricants. As discussed in Section III, a wide variety of drawing lubricants are used in order to ensure uniform drawing temperatures and avoid excessive wear on the dies and mandrels. Drawing lubricants are usually recycled until no longer effective. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-122.

Since none of the plants surveyed reported discharging the drawing spent lubricants, no samples were collected.

<u>Refractory Metals Extrusion Spent Lubricants</u>. As discussed in Section III, the extrusion process requires the use of a lubricant to prevent adhesion of the metal to the die and ingot container walls. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-123.

Since none of the plants surveyed reported discharging the extrusion spent lubricants, no samples were collected.

<u>Refractory Metals Extrusion Press Hydraulic Fluid Leakage</u>. As discussed in Section III, due to the large force applied by a hydraulic press, some hydraulic fluid leakage is unavoidable. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-124.

Table V-125 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of extrusion press hydraulic fluid leakage was collected during the sampling program. Elevated concentrations of copper (21 mg/l), molybdenum (20 mg/l), oil and grease (44,000 mg/l), and total suspended solids (19,000 mg/l) were detected in the sample.

<u>Refractory Metals Forging Spent Lubricants</u>. As discussed in Section III, proper lubrication of the dies is essential in forging refractory metals. Of the plants surveyed reporting the use of forging lubricants, all reported total consumption due to evaporation and drag-out. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-126.

Since none of the plants surveyed reported discharging the forging spent lubricants, no samples were collected.

<u>Refractory Metals Forging Contact Cooling Water</u>. As discussed in Section III, heat treatment is frequently used after forging to attain the desired mechanical properties in the forged metal. Contact cooling water may be used to cool the forged metal at a controlled rate after heat treatment. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-127.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to nickel-cobalt extrusion press and solution heat treatment contact cooling water. These two waste streams are generated by using water, without additives, to cool hot metal. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of refractory metals in refractory metals forging contact cooling water should be similar to the mass loading of nickel in nickel extrusion press and solution heat treatment contact cooling water, and vice versa. Also, the mass loading of chromium should be insignificant because refractory metals are seldom alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar. After proposal, these assumptions were confirmed by plant self-sampling data.

Refractory Metals Metal Powder Production Wastewater. As discussed in Section III, refractory metal powders are frequently produced by mechanical reduction. The most common pieces of mechanical reduction equipment are ball mills, vortex mills, hammer mills, disc mills, and roll mills. Water or other liquids may be used to aid in the milling operation or to facilitate handling after powder is produced. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-128.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to tumbling or burnishing wastewater in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Refractory Metals Metal Powder Production Floor Wash Wastewater. As discussed in Section III, floor washing may be necessary in metal powder production areas to keep to a minimum airborne particles and to keep powder dust off the floor so that it does not become slippery and a safety hazard. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-129.

No samples of metal powder production floor wash water were collected during the sampling program. However, the Agency assumed that this stream would have wastewater characteristics similar to area cleaning wastewater in the uranium forming subcategory. These two waste streams are generated by plant cleanups. The only difference should be the metals present. The mass loading (mg/kkg) of refractory metals in refractory metals metal powder production floor wash water should be similar to the mass loading of uranium in uranium area cleaning wastewater, and vice versa. The other pollutants present in each waste stream, and the mass loading at which they are present, should be similar.

Refractory Metals Metal Powder Pressing Spent Lubricants. As discussed in Section III, a forming medium may be used to lubricate the pressing of green shapes, which are subsequently sintered. Lubricants may be recycled and lost through drag-out. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-130.

Since none of the plants surveyed reported discharging the metal powder pressing spent lubricants, no samples were collected.

Refractory Metals Surface Treatment Spent Baths. As discussed in Section III, a number of chemical treatments may be applied after the forming of refractory metal products. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-131.

Table V-132 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of surface treatment spent baths was collected. Elevated concentrations of nickel (12.4 mg/l), copper (6.3 mg/l), silver (6.1 mg/l), and TSS (140 mg/l) were detected in the sample.

Refractory Metals Surface Treatment Rinse. As discussed in Section III, rinsing following the surface treatment process to prevent the solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-133.

Table V-134 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Five samples of surface treatment rinsewater were collected from five streams at five plants. Elevated concentrations of nickel (10.2 mg/l), columbium, tantalum, tungsten and TSS (140 mg/l) were detected in the samples.

Refractory Metals Alkaline Cleaning Spent Baths. As discussed in Section III, alkaline cleaners are formulations of alkaline salts, water, and surfactants. Spent solutions are discharged from alkaline cleaning processes. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-135.

Table V-136 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of alkaline cleaning spent baths was collected at one plant. Elevated concentrations of lead (9.9 mg/l), columbium (865 mg/l), and tantalum (585 mg/l) were detected in the sample.

Refractory Metals Alkaline Cleaning Rinse. As discussed in Section III, following alkaline treating, metal parts are rinsed. Rinses are discharged from alkaline cleaning processes. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-137.

No samples of alkaline cleaning rinsewater were collected during the sampling program. However, the Agency assumed that this stream would have wastewater characteristics similar to alkaline cleaning rinsewater in the nickel-cobalt subcategory. These two waste streams are generated by using water to remove alkaline cleaning solutions from cleaned metal. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of refractory metals in refractory metals alkaline cleaning rinsewater should be similar to the mass loading of nickel in nickel alkaline cleaning rinsewater, and vice versa. Also, the mass loading of chromium should be insignificant because refractory metals are seldom alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

Refractory Metals Molten Salt Rinsewater. As discussed in Section III, when molten salt baths are used to descale refractory metal alloys, they are generally followed by a water quench and rinse step. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-138.

Table V-139 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Six samples of molten salt rinsewater were collected from four streams at three plants. Elevated concentrations of tantalum (2.5 mg/l), columbium (2.3 mg/l), chromium (0.400 mg/l), and TSS (540 mg/l) were detected in the samples.

Refractory Metals Tumbling or Burnishing Wastewater. As discussed in Section III, tumbling is a controlled method of processing parts to remove burrs, scale, flash, and oxides as well as to improve surface finish. Burnishing is the process of finish sizing or smooth finishing a workpiece (previously machined or ground) by displacement, rather than removal, of minute surface irregularities. Water is used to facilitate tumbling and burnishing. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-140.

Table V-141 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Six samples of tumbling, burnishing wastewater were collected from four streams at two plants. Elevated concentrations of copper lead, nickel (103 mg/l), tungsten and TSS (2,700 mg/l) were detected in the samples.

Refractory Metals Sawing or Grinding Spent Neat Oils. As discussed in Section III, sawing or grinding operations may use mineral-based oils or heavy grease as the lubricant required to minimize friction and act as a coolant. Normally, cutting oils are not discharged as a wastewater stream. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-142.

Since none of the plants surveyed reported discharging spent sawing or grinding neat oils, no samples were collected.

Refractory Metals Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require a lubricant in order to minimize friction and act as a coolant. Oil-water emulsions are frequently used to lubricate sawing and grinding operations. The emulsions are usually recycled with in-line filtration to remove swarf and batch discharged periodically as their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-143.

Table V-144 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Six samples of sawing or grinding spent emulsions were collected at five plants.

Refractory Metals Sawing or Grinding Contact Cooling Water. As discussed in Section III, a liquid which functions as lubricant and coolant is frequently needed during sawing and grinding. Water is one type of liquid which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-145.

Table V-146 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of sawing or grinding contact cooling water were collected from two streams at two plants. Elevated concentrations of molybdenum (5,470 mg/l), iron (13.0 mg/l), and TSS (310 mg/l) were detected in the samples.

Refractory Metals Sawing or Grinding Rinse. As discussed in Section III, the formed metals may be rinsed following sawing or grinding to remove the lubricants and saw chips for reprocessing. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-147.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to sawing or grinding contact cooling water in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Refractory Metals Dye Penetrant Testing Wastewater. As described in Section III, testing operations are used to check nonferrous metals parts for discontinuities that are open to the surface in the part being tested. Dye penetrant testing operations are sources of wastewater because the parts must be rinsed following penetration of the dye so that, upon inspection, dye will only remain in the discontinuities. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-148.

Table V-149 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of dye penetrant testing wastewater was collected during the sampling program. Elevated concentrations of nickel (1.6 mg/l), oil and grease (72 mg/l), and TSS (22 mg/l) were detected in the sample.

Refractory Metals Equipment Cleaning Wastewater. As discussed in Section III, extrusion and forging equipment may be periodically cleaned in order to prevent the excessive build-up of oil and grease on the dies. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-150.

Table V-151 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Three samples of equipment cleaning wastewater were collected at two plants.

Refractory Metals Miscellaneous Wastewater Sources. As discussed in Section III, several low volume sources of wastewater were reported on the dcps and observed during the site and sampling visits. These sources include wastewater from a post-oil dip coating rinse, a quench of extrusion tools, and spent roll grinding emulsions. Because they generally represent low volume periodic discharges applicable to most plants, the Agency is including an allowance for all of these streams under the miscellaneous wastewater sources waste stream. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-152.

No samples of miscellaneous wastewater sources were collected during the sampling program. However, the Agency believes that this stream will have wastewater characteristics similar to forging contact cooling water in the nickel-cobalt subcategory. However, the mass loading (mg/kkg) of oil and grease is expected to be higher, while the mass loading of TSS is expected to be lower in miscellaneous wastewater sources than in forging contact cooling water. In addition, the metals present in the two waste streams are expected to differ. The mass loading (mg/kkg) of refractory metals in refractory metals miscellaneous wastewater sources should be similar to the mass loading of nickel in nickel forging contact cooling water, and vice versa. Also, the mass loading of chromium should be insignificant because refractory metals are seldom alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, with the exception of TSS and oil and grease, should be similar.

Refractory Metals Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

Refractory Metals Wet Air Pollution Control Blowdown. As discussed in Section III, wet air pollution control devices are needed to accompany some operations in order to meet air quality standards. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-153.

Table V-154 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of wet air pollution control blowdown were collected from two streams at two plants. Elevated concentrations of lead (0.16 mg/l) and TSS (150 mg/l) were detected in the samples.

Refractory Metals Operations Which Do Not Use Process Water. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, because they use only noncontact cooling water or because they use no water at all:

Powder Metallurgy Operations (Pressing, Sintering)
Annealing
Soldering
Welding
Screening
Blending
Straightening
Blasting.

Titanium Forming Subcategory

Titanium Rolling Spent Neat Oils. As discussed in Section III, the rolling of titanium products typically requires the use of mineral oil lubricants. The oils are usually recycled with in-line filtration and periodically disposed of by sale to an oil reclaimer or by incineration. Because discharge of this stream is not practiced, limited flow data were available for analysis. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-155.

Since none of the plants surveyed reported discharging the rolling spent neat oils, no samples of this waste stream were collected.

Titanium Rolling Contact Cooling Water. As discussed in Section III, a liquid which functions as a lubricant and coolant is necessary during rolling to prevent excessive wear on the rolls, to prevent adhesion of metal to the rolls, and to maintain a suitable and uniform rolling temperature. Water is one type of liquid which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-156.

Titanium Drawing Spent Neat Oils. As discussed in Section III, oil-based lubricants may be required in draws which have a high reduction in diameter. Drawing oils are usually recycled until their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-157.

Since none of the plants surveyed reported discharging the drawing spent neat oils, no samples were collected.

Titanium Extrusion Spent Neat Oils. As discussed in Section III, oil-based lubricants may be required in extrusions which have a high reduction in diameter. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-158.

Since none of the plants surveyed reported discharging spent extrusion neat oils, no samples were collected.

Titanium Extrusion Spent Emulsions. As discussed in Section III, the extrusion process requires the use of a lubricant to prevent adhesion of the metal to the die and ingot container walls. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-159.

No samples of extrusion spent emulsions were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that discharged titanium extrusion emulsions would have wastewater characteristics similar to rolling spent emulsions in the nickel-cobalt subcategory. These two waste streams are generated from operations which use similar process chemicals for similar purposes (lubrication). The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of titanium in titanium extrusion spent emulsions should be similar to the mass loading of nickel in nickel rolling spent emulsions, and vice versa. However, the mass loading of chromium should be insignificant because titanium is seldom alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

Titanium Extrusion Press Hydraulic Fluid Leakage. As discussed in Section III, due to the large force applied by a hydraulic press, some hydraulic fluid leakage is unavoidable. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-160.

Table V-161 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of extrusion press hydraulic fluid was collected at one plant. No pollutants were detected in the sample above treatable concentrations.

Titanium Forging Spent Lubricants. As discussed in Section III, either a water or oil medium can be sprayed onto forging dies for proper lubrication. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-162.

Since none of the plants surveyed reported wastewater discharge values for forging spent lubricants, no samples were collected.

Titanium Forging Contact Cooling Water. As discussed in Section III, forging dies may require cooling to maintain the proper die temperature between forgings. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-163.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to forging contact cooling water in the nickel-cobalt subcategory. These two waste streams are generated by using water, without additives, to cool hot forgings and forging dies. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of titanium in titanium forging die contact cooling water should be similar to the mass loading of nickel in nickel forging die contact cooling water, and vice versa. However, the mass loading of chromium should be insignificant because titanium is seldom alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar. After proposal, these assumptions were confirmed by plant self-sampling data.

Titanium Forging Equipment Cleaning Wastewater. Forging equipment may be periodically cleaned in order to prevent the excessive build-up of oil and grease on the forging die. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-164.

To estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to forging contact cooling water in the nickel-cobalt subcategory. These assumptions were confirmed by plant self-sampling data.

Titanium Forging Press Hydraulic Fluid Leakage. As discussed in Section III, due to the large force applied by a hydraulic press, some hydraulic fluid leakage is unavoidable. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-165.

One sample of forging press hydraulic fluid leakage was collected at one plant. An elevated concentration of oil and grease

(370,000 mg/l) was detected in this sample.

Titanium Tube Reducing Spent Lubricants. As discussed in Section III, tube reducing, much like rolling, may require a lubricating compound in order to prevent excessive wear of the tube reducing rolls, and to maintain a suitable and uniform tube reducing temperature. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-166.

Table V-167 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Three samples of tube reducing lubricant were sampled at three plants.

Titanium Heat Treatment Contact Cooling Water. As discussed in Section III, heat treatment is used by plants in the nonferrous metals forming category to give the metal the desired mechanical properties. After heat treatment, the metals must be cooled at a controlled rate. Contact cooling water may be used for this purpose. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-168.

Table V-169 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Five samples of heat treatment contact cooling water were sampled at five plants. Elevated concentrations of copper (11.0 mg/l), zinc (6.7 mg/l), aluminum (24.0 mg/l), iron (440 mg/l), titanium (2.0 mg/l) and TSS (390 mg/l) were detected in these samples.

Titanium Surface Treatment Spent Baths. As discussed in Section III, a number of chemical treatments may be applied after the forming of titanium products. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-170.

Table V-171 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of surface treatment spent baths were collected from three streams at two plants. Elevated concentrations of chromium, titanium (60,300 mg/l), lead (214 mg/l), nickel, zinc (166 mg/l), and TSS (3,360 mg/l) were detected in the samples.

Titanium Surface Treatment Rinse. As discussed in Section III, rinsing follows the surface treatment process to prevent the solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-172.

Table V-173 summarizes the analytical sampling data for priority

and selected conventional and nonconventional pollutants. Nine samples of surface treatment rinsewater were collected from four streams at two plants. Elevated concentrations of chromium, lead (5.9 mg/l), nickel, titanium (186 mg/l), and TSS (66 mg/l) were detected in the samples.

Titanium Alkaline Cleaning Spent Baths. As discussed in Section III, alkaline cleaning is commonly used to clean formed metal parts. Products can be cleaned with an alkaline solution either by immersion or spray. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-174.

Table V-175 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Five samples of alkaline cleaning baths were collected at four plants. Elevated concentrations of copper (6.3 mg/l), iron (5.4 mg/l), titanium (6.5 mg/l), oil and grease (930 mg/l) and TSS (400 mg/l) were detected in these samples.

Titanium Alkaline Cleaning Rinse. As discussed in Section III, rinsing follows the alkaline cleaning process to prevent the solution from drying on the product. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-176.

Table V-177 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Four samples of alkaline cleaning rinsewater were collected at four plants. Elevated concentrations of copper (6.3 mg/l), and iron (1.9 mg/l) were detected in these samples.

Titanium Molten Salt Rinse. As discussed in Section III, when molten salt baths are used to descale titanium alloys, they are generally followed by a water quench and rinse step. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-178.

Titanium Tumbling Wastewater. As described in Section III, tumbling is an operation in which forgings are rotated in a barrel with ceramic or metal slugs or abrasives to remove scale, fins, oxides, or burrs. It may be done dry, with water, or an aqueous solution containing cleaning compounds, rust inhibitors, or other additives. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-179.

Table V-180 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of tumbling wastewater was collected. Elevated concentrations of titanium (156 mg/l), iron (111 mg/l), aluminum (182 mg/l), boron (116 mg/l), fluoride (110 mg/l), ammonia (34 mg/l), cyanide (4.1 mg/l), oil and grease (17 mg/l), and TSS (6,800 mg/l) were detected in the sample.

Titanium Sawing or Grinding Spent Neat Oils. As discussed in Section III, sawing or grinding operations may use mineral-based oils or heavy grease as the lubricant required to minimize friction and act as a coolant. Normally, cutting oils are not discharged as a wastewater stream. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-181.

Since none of the plants surveyed reported discharging the sawing or grinding spent neat oils, no samples were collected.

Titanium Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require a lubricant in order to minimize friction and act as a coolant. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-182.

Table V-183 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of sawing or grinding emulsions and synthetic coolants were collected from three streams at two plants.

Titanium Sawing or Grinding Contact Cooling Water. As discussed in Section III, a substance which functions as a lubricant and coolant is frequently needed during sawing or grinding. Water is one substance which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-184.

Table V-185 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of sawing or grinding contact cooling water was collected at one plant. Elevated concentrations of magnesium (13.5 mg/l) and titanium (7.06 mg/l) were detected in this sample.

Titanium Dye Penetrant Testing Wastewater. As discussed in Section III, testing operations are used to check nonferrous metals parts for discontinuities that are open to the surface in the part being tested. Dye penetrant testing operations are sources of wastewater because the parts must be rinsed following penetration of the dye so that, upon inspection, dye will only remain in the discontinuities. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-186.

Titanium Hydrotesting Wastewater. As discussed in Section III, titanium tubes can be filled with pressurized water for leak-testing. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-187.

No samples of hydrotesting wastewater were taken, but the Agency does not believe that using water, without additives, in contact with clean metal will contaminate the water with treatable concentrations of pollutants.

Titanium Miscellaneous Wastewater Streams. As discussed in Section III, low volume sources of wastewater were reported on the dcps. These sources are saw spillage and tool cleaning wastewater. Because they generally represent low volume periodic discharges applicable to most plants, the Agency is including an allowance for all of these streams under the miscellaneous wastewater sources waste stream.

No samples of miscellaneous wastewater sources were collected during the sampling program. However, the Agency believes that this stream will have wastewater characteristics similar to forging contact cooling water in the nickel-cobalt subcategory. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of titanium in titanium miscellaneous wastewater sources should be similar to the mass loading of nickel in nickel forging contact cooling water, and vice versa. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

Titanium Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

Titanium Wet Air Pollution Control Blowdown. As discussed in Section III, wet air pollution control devices are needed to accompany some operations in order to meet air quality standards. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-188.

Table V-189 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of surface treatment wet air pollution control blowdown were collected from two streams at two plants. Elevated concentrations of chromium, nickel, titanium and TSS (40 mg/l) were detected in the samples.

Titanium Operations Which Do Not Use Process Water. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, because they use only noncontact cooling water or because they use no water at all:

Casting
Shot Blasting
Grit Blasting
Machining
Torching
Deoxidizing
Straightening
Trimming
Piercing
Shearing.

Uranium Forming Subcategory

Uranium Extrusion Spent Lubricants. As discussed in Section III, the extrusion process requires the use of a lubricant to prevent adhesion of the metal to the die and ingot container walls. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-190.

Since none of the plants surveyed reported wastewater discharge values for extrusion spent lubricants, no samples were collected.

Uranium Extrusion Tool Contact Cooling Water. As discussed in Section III, following an extrusion, the dummy block drops from the press and is cooled before being used again. Water is sometimes used to quench the extrusion tools. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-191.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to forging contact cooling water in the nickel-cobalt subcategory. These two waste streams are generated by using water, without added process chemicals, to cool metal forming equipment. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of uranium in uranium extrusion tool contact cooling water should be similar to the mass loading of nickel in nickel forging contact cooling water, and vice versa. However, there should be no significant mass loading of chromium in uranium extrusion tool contact cooling water because uranium is not commonly alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar. After proposal, these assumptions were confirmed by plant self-sampling data.

Uranium Forging Spent Lubricants. As discussed in Section III, proper lubrication of the dies is essential in forging nonferrous metals. A colloidal graphite lubricant is commonly sprayed onto the dies for this purpose. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-192.

Since none of the plants surveyed reported wastewater discharge values for forging spent lubricants, no samples were collected.

Uranium Heat Treatment Contact Cooling Water. As discussed in Section III, heat treatment is used by plants in the nonferrous metals forming category to give the metal the desired mechanical properties. After heat treatment, the metals must be cooled at a controlled rate. Contact cooling water may be used for this purpose. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-193.

Table V-194 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of heat treatment contact cooling water were collected from three streams at one plant. Elevated concentrations of lead (14.0 mg/l), nickel (2.3 mg/l), uranium (51.5 mg/l), oil and grease (84 mg/l), and TSS (100 mg/l) were detected in the samples.

Uranium Surface Treatment Spent Baths. As discussed in Section III, a number of chemical treatments may be applied after forming uranium products. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-195.

Table V-196 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of surface treatment spent bath was collected at one plant. Elevated concentrations of copper (16.0 mg/l), lead (860.0 mg/l), and aluminum (430.0 mg/l) were detected in the sample. This sample was not analyzed for uranium but plant personnel reported that its concentration was about 280 g/l.

Uranium Surface Treatment Rinse. As discussed in Section III, rinsing generally follows the surface treatment process to prevent the solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-197.

Table V-198 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of surface treatment rinse were collected from two streams at one plant. Elevated concentrations of copper (12.0 mg/l), lead (110.0 mg/l), nickel (3.4 mg/l), uranium (2,700 mg/l), and TSS (430 mg/l) were detected in the samples.

Uranium Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require a lubricant in order to minimize friction and act as a coolant.

The emulsions are typically recirculated, with in-line filtration to remove swarf, and periodically batch discharged as the lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-199.

Table V-200 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of sawing or grinding spent emulsions was collected at one plant. Elevated concentrations of phenanthrene (32.607 mg/l), lead (7.3 mg/l), zinc (7.5 mg/l), uranium (37.5 mg/l), oil and grease (7,500 mg/l), and TSS (510 mg/l) were detected in the sample.

Uranium Sawing or Grinding Contact Cooling Water. As discussed in Section III, a substance which functions as a lubricant and coolant is frequently needed during sawing and grinding. Water is one type of substance which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-201.

No samples of sawing or grinding contact cooling water were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to sawing or grinding contact cooling water in the refractory metals subcategory. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of uranium in uranium sawing or grinding contact cooling water should be similar to the mass loading of refractory metals in refractory metals sawing or grinding contact cooling water, and vice versa. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

Uranium Sawing or Grinding Rinse. As discussed in Section III, following the sawing or grinding operations, the lubricant and sawing and grinding fines occasionally need to be rinsed off the formed metal. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-202.

No samples of sawing or grinding rinse were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to sawing or grinding contact cooling water in the refractory metals subcategory. These waste streams are both derived from sawing or grinding operations, so the only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of uranium in uranium sawing or grinding rinse should be similar to the mass loading of refractory metals in refractory metals sawing or grinding contact cooling water, and vice versa. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

Uranium Area Cleaning Washwater. As discussed in Section III, OSHA requirements dictate area cleaning or floor washing at uranium forming facilities. Area cleaning helps to minimize airborne uranium particles and hence helps control radiation exposure. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-203.

Table V-204 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of area cleaning wastewater were collected from three streams at one plant. Elevated concentrations of p-chloro-m-cresol (15.031 mg/l), bis(2-ethylhexyl) phthalate (4.879 mg/l), lead (4.1 mg/l), copper (2.3 mg/l), zinc (11.0 mg/l), uranium (130 mg/l), oil and grease (6,000 mg/l), and TSS (1,600 mg/l) were detected in the samples.

Uranium Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

Uranium Wet Air Pollution Control Blowdown. As discussed in Section III, wet air pollution control devices are needed to control air emissions from some operations in order to meet air quality standards. Scrubbers are frequently needed to control acid fumes from surface treatment operations. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-205.

Table V-206 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of surface treatment wet air pollution control blowdown was collected at one plant. Elevated concentrations of zinc (1.1 mg/l), uranium (1,000 mg/l), and TSS (650 mg/l) were detected in the sample.

Uranium Drum Washwater. As discussed in Section III, solid waste from uranium forming operations is stored in drums and shipped to a low-level radioactive waste landfill. The drums are required to be free from external radioactive contamination prior to shipment. Drums are washed with soapy water which may be recycled using in-line filtration prior to discharge. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-207.

Table V-208 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of drum wash water was collected at one plant. Elevated concentrations of uranium (5.7 mg/l), magnesium (28.6 mg/l), and TSS (23 mg/l) were detected in the sample.

Uranium Laundry Washwater. As discussed in Section III, OSHA requirements dictate employees' clothing must remain on-site. Therefore, laundry service is provided by the plant. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-209.

Table V-210 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of laundry wash water was collected at one plant. Elevated concentrations of oil and grease (42 mg/l) and TSS (11 mg/l) were detected in the sample.

Uranium Operations Which Do Not Use Process Water. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, because they use only noncontact cooling water or because they use no water at all:

Stationary Casting
Direct Chill Casting
Salt Solution Heat Treatment.

Zinc Forming Subcategory

Zinc Rolling Spent Neat Oils. As described in Section III, mineral oil or kerosene-based lubricants can be used in the rolling of zinc products. The oils are usually recycled with in-line filtration and periodically disposed of by sale to an oil reclaimer or by incineration. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-211.

Since none of the plants surveyed reported discharging the rolling spent neat oils, no samples were collected.

Zinc Rolling Spent Emulsions. As discussed in Section III, oil-water emulsions are used in rolling operations as coolants and lubricants. Rolling emulsions are typically recycled using in-line filtration treatment, with periodic batch discharge of the recycled emulsion. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-212.

No samples of rolling spent emulsions were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to rolling spent emulsions in the lead-tin-bismuth subcategory. These two waste streams are generated by identical physical processes which use similar process chemicals. The only difference should be the identity of metals present. The mass loading (mg/kkg) of zinc in zinc rolling spent emulsions should be similar to the mass loading of lead in lead rolling spent emulsions, and vice versa. The other pollutants present in each waste stream, and the mass loading at which they are present, should be similar.

Zinc Rolling Contact Cooling Water. As discussed in Section III, it is necessary to use a lubricant-coolant during rolling to prevent excessive wear on the rolls, to prevent adhesion of metal to the rolls, and to maintain a suitable and uniform rolling temperature. Water is one type of lubricant-coolant which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-213.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to shot casting contact cooling water in the lead-tin-bismuth subcategory. These two waste streams are generated by using water, without additives, to cool hot metal. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of zinc in zinc rolling contact cooling water should be similar to the mass loading of lead in lead shot casting contact cooling water, and vice versa. The other pollutants present in each waste stream, and the mass loading at which they are present, should be similar. After proposal, these assumptions were confirmed by plant self-sampling data.

Zinc Drawing Spent Emulsions. As discussed in Section III, oil-water emulsions are used for many drawing applications in order to ensure uniform drawing temperatures and avoid excessive wear on the dies and mandrels used. The drawing emulsions are frequently recycled and batch discharged periodically after their lubricating properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-214.

No samples of drawing spent emulsions were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to rolling spent emulsions in the lead-tin-bismuth subcategory. These waste streams are generated from operations using similar process chemicals (oil-in-water emulsions) for similar purposes (lubrication). The only difference should be the metals present. The mass loading (mg/kkg) of zinc in zinc drawing spent emulsions should be similar to the mass loading of lead in lead rolling spent emulsions, and vice versa. The other pollutants present in each waste stream, and the mass loading at which they are present, should be similar.

Zinc Direct Chill Casting Contact Cooling Water. As discussed in Section III, contact cooling water is a necessary part of direct chill casting. The cooling water may be contaminated by lubricants applied to the mold before and during the casting process. The cooling water may be recycled. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-215.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to semi-continuous ingot casting contact cooling water in the lead-tin-bismuth subcategory. After proposal, these assumptions were confirmed by plant self-sampling data. These two waste streams are generated by using water, without additives, to cool cast metal. Since lubricants may be applied to the casting molds in both processes, both streams may be contaminated by these lubricants. The only difference between the waste streams should be the metals present. The mass loading (mg/kkg) of zinc in zinc direct chill casting contact cooling water should be similar to the mass loading of lead in lead semi-continuous ingot casting contact cooling water, and vice versa. The other pollutants present in each waste stream, and the mass loading at which they are present, should be similar.

Zinc Stationary Casting Contact Cooling Water. As discussed in Section III, lubricants and cooling water are usually not required in stationary casting. Since molten metal is poured into the molds, if contact cooling water is used, it is frequently lost due to evaporation. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-216.

Since none of the plants surveyed reported discharging the stationary casting contact cooling water, no samples were collected.

Zinc Heat Treatment Contact Cooling Water. As discussed in Section III, contact cooling water may be used for controlled-rate cooling of heat-treated metals. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-217.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to continuous strip casting contact cooling water in the lead-tin-bismuth subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Zinc Surface Treatment Spent Baths. As discussed in Section III, a number of chemical treatments may be applied after the forming of zinc products. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-218.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to surface treatment spent baths in the magnesium subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Zinc Surface Treatment Rinse. As discussed in Section III, rinsing follows the surface treatment process to prevent the solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-219.

Table V-220 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of surface treatment rinse was collected at one plant. Elevated concentrations of zinc (42.3 mg/l), chromium (0.160 mg/l), nickel (8.10 mg/l), and TSS (20 mg/l) were detected in the sample.

Zinc Alkaline Cleaning Spent Baths. As discussed in Section III, alkaline cleaners are formulations of alkaline salts, water, and surfactants. Spent solutions are discharged from alkaline cleaning processes after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-221.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to alkaline cleaning rinsewater in this subcategory. After proposal, this assumption was confirmed by plant self-sampling data.

Zinc Alkaline Cleaning Rinse. As discussed in Section III, following alkaline treating, metal parts are rinsed. Rinses are discharged from alkaline cleaning processes. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-222.

Table V-223 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. One sample of alkaline cleaning rinse was collected at one plant. Elevated concentrations of zinc (1.12 mg/l), cyanide (1.3 mg/l), oil and grease (23 mg/l), and TSS (90 mg/l) were detected in the sample.

Zinc Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require a lubricant in order to minimize friction and act as a coolant. Oil-water emulsions are frequently used as lubricants. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-224.

At proposal, the Agency assumed that this stream would have wastewater characteristics similar to sawing or grinding spent emulsions in the nickel-cobalt subcategory. These two waste streams are generated by identical physical processes which use similar process chemicals. The only difference should be the metals present. The mass loading (mg/kkg) of zinc in zinc sawing or grinding spent emulsions should be similar to the mass loading of nickel in nickel sawing or grinding spent emulsions, and vice versa. The mass loading of chromium in zinc sawing or grinding spent emulsions should be insignificant, since chromium is often alloyed with nickel but not with zinc. The other pollutants present in each waste stream, and the mass loading at which they are present, should be similar. After proposal, these assumptions were confirmed by plant self-sampling data.

Zinc Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

Zinc Electrocoating Rinse. As discussed in Section III, products are usually rinsed following electrocoating before they are subsequently formed. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-225.

No samples of electrocoating rinse were collected during the sampling program. However, the characteristics of the rinse are expected to include the pollutants present in the electrocoating bath solution. Electrocoating of copper onto zinc generates wastewater with significant concentrations of copper and cyanide.

Zinc Operations Which Do Not Use Process Water. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, either because they are dry operations or because they use only noncontact cooling water:

Continuous Casting
Melting
Slitting

Stamping
Sawing
Homogenizing
Printing
Coating
Drying
Metal Powder Production.

Zirconium-Hafnium Forming Subcategory

Zirconium-Hafnium Rolling Spent Neat Oils. As discussed in Section III, mineral oil or kerosene-based lubricants can be used in the rolling of zirconium-hafnium products. The oils are usually recycled with in-line filtration and periodically disposed of by sale to an oil reclaimer or by incineration. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-226.

Since none of the plants surveyed reported discharging the rolling spent neat oils, no samples were collected.

Zirconium-Hafnium Drawing Spent Lubricants. As discussed in Section III, a suitable lubricant is required to ensure uniform drawing temperatures and avoid excessive wear on the dies and mandrels used. A wide variety of lubricants can be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-227.

Since none of the plants surveyed reported discharging the drawing spent lubricants, no samples were collected.

Zirconium-Hafnium Extrusion Spent Lubricants. As discussed in Section III, the extrusion process requires the use of a lubricant to prevent adhesion of the metal to the die and ingot container walls. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-228.

Since none of the plants surveyed reported discharging the extrusion spent lubricants, no samples were collected.

Zirconium-Hafnium Extrusion Press Hydraulic Fluid Leakage. As discussed in Section III, due to the large force applied by a hydraulic press, some hydraulic fluid leakage is unavoidable. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-229.

Table V-230 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of extrusion press hydraulic fluid leakage was collected at one plant. No pollutants were found in this sample at treatable concentrations.

Zirconium-Hafnium Swaging Spent Neat Oils. As discussed in Section III, mineral oil can be used in the swaging of zirconium-hafnium products. The oils are usually recycled with in-line filtration and periodically disposed of by sale to an oil reclaimer or by incineration. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-231.

Since none of the plants surveyed reported discharging the swaging spent neat oils, no samples were collected.

Zirconium-Hafnium Tube Reducing Spent Lubricants. As discussed in Section III, tube reducing, much like rolling, may require a lubricating compound in order to prevent excessive wear of the tube reducing equipment, prevent adhesion of metal to the tube reducing equipment, and maintain a suitable and uniform tube reducing temperature. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-232.

Zirconium-Hafnium Heat Treatment Contact Cooling Water. As discussed in Section III, heat treatment is used by plants in the nonferrous metals forming category to give the metal the desired mechanical properties. After heat treatment, the metals must be cooled at a controlled rate. Contact cooling water may be used for this purpose. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-233.

Table V-234 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Five samples of heat treatment contact cooling water were collected from three plants. Elevated concentrations of aluminum (3.0 mg/l), iron (12 mg/l), magnesium (30 mg/l) and molybdenum (370 mg/l) were detected in this sample.

Zirconium-Hafnium Surface Treatment Spent Baths. As discussed in Section III, a number of chemical treatments may be applied after the forming of zirconium-hafnium products including pickling and coating. The surface treatment baths must be periodically discharged after their properties are exhausted. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-235.

Table V-236 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of surface treatment spent baths were collected from three streams at two plants. Elevated concentrations of antimony (6 mg/l), zinc (7.5 mg/l), chromium (24 mg/l), nickel (3.6 mg/l), zirconium (3,100 mg/l), and oil and grease (83.9 mg/l) were detected in the samples.

Zirconium-Hafnium Surface Treatment Rinse. As discussed in Section III, rinsing follows the surface treatment process to prevent the solution from affecting the surface of the metal beyond the desired amount. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-237.

Zirconium-Hafnium Alkaline Cleaning Spent Baths. As discussed in Section III, alkaline cleaners are formulations of alkaline salts, water, and surfactants. Spent solutions are discharged from alkaline cleaning processes. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-238.

Zirconium-Hafnium Alkaline Cleaning Rinse. As discussed in Section III, following alkaline cleaning, metal parts are rinsed. Rinses are discharged from alkaline cleaning processes. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-239.

Zirconium-Hafnium Molten Salt Rinse. As discussed in Section III, when molten salt baths are used to descale zirconium-hafnium alloys, they are generally followed by a water quench and rinse step. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-240.

No samples of molten salt rinse were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to molten salt rinse in the nickel-cobalt subcategory. These two waste streams are generated from using water to remove salt solutions from descaled metal. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of zirconium-hafnium in zirconium-hafnium molten salt rinse should be similar to the mass loading of nickel in nickel molten salt rinse, and vice versa. However, the mass loading of chromium should be insignificant because zirconium-hafnium is seldom alloyed with chromium. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

Zirconium-Hafnium Sawing or Grinding Spent Neat Oils. As discussed in Section III, sawing or grinding operations may use mineral-based oils or heavy grease as the lubricant required to minimize friction and act as a coolant. Normally, cutting oils are not discharged as a wastewater stream. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-241.

Since none of the plants surveyed reported discharging the sawing spent neat oils, no samples were collected.

Zirconium-Hafnium Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require a lubricant in order to minimize friction and act as a coolant. Oil-water emulsions are often used as lubricants. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-242.

Zirconium-Hafnium Sawing or Grinding Contact Cooling Water. As discussed in Section III, a lubricant is frequently needed during sawing or grinding. Water, without additives, is one type of lubricant which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-243.

No samples of sawing or grinding contact cooling water were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to sawing or grinding spent emulsions in this subcategory. These two waste streams are generated from using a lubricant to saw or grind zirconium-hafnium. Therefore, the pollutants present and the mass loadings of pollutants present in these two waste streams are expected to be similar.

Zirconium-Hafnium Sawing or Grinding Rinse. As discussed in Section III, following the sawing and grinding operations, the lubricant and fines from sawing and grinding may need to be rinsed off the formed metal. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-244.

Zirconium-Hafnium Inspection and Testing Wastewater. As discussed in Section III, testing operations are used to check zirconium-hafnium parts for surface defects or subsurface imperfections as well as overall product integrity. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-245.

Table V-246 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. Four samples of inspection and testing wastewater were collected at three plants. No pollutants were found in this sample at treatable concentrations.

Zirconium-Hafnium Degreasing Spent Solvents. As discussed in Section III, immersion-vapor degreasing is used to clean metal parts coated with large quantities of oil, grease, or hard-to-remove soil. Solvents used may be the same as those used in straight vapor degreasing. Solutions of organic solvent in water are also used for degreasing. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-247.

Zirconium-Hafnium Degreasing Rinse. As discussed in Section III, it is sometimes necessary to rinse degreased parts with water to meet certain product specifications. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-248.

Zirconium-Hafnium Wet Air Pollution Control Blowdown. As discussed in Section III, wet air pollution control devices are needed to accompany some operations in order to meet air quality standards. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-249.

No samples of wet air pollution control blowdown were collected during the sampling program. However, to estimate pollutant loads for this stream, the Agency assumed that this stream would have wastewater characteristics similar to wet air pollution control blowdown in the titanium subcategory. The two waste streams derive from air pollution control devices used to collect and concentrate airborne particulates. The only difference between the wastewater characteristics of the two streams should be the metals present. The mass loading (mg/kkg) of zirconium-hafnium in zirconium-hafnium wet air pollution control blowdown should be similar to the mass loading of titanium in titanium wet air pollution control blowdown, and vice versa. The other pollutants in each waste stream, and the mass loading at which they are present, should be similar.

<u>Zirconium-Hafnium Operations Which Do Not Use Process Water</u>. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, because they use only noncontact cooling water or because they use no water at all:

- Rolling
- Casting
- Annealing
- Shot Blasting
- Grit Blasting
- Bead Blasting
- Polishing
- Straightening
- Cutting, Trimming
- Deburring, Sanding.

Metal Powders Subcategory

<u>Metal Powder Production Atomization Wastewater</u>. As discussed in Section III, wet atomization is a method of producing metal powder in which a stream of water impinges upon a molten metal stream, breaking it into droplets which solidify as powder particles. Water atomization is used to produce irregularly shaped particles required for powder metallurgy applications in which a powder is cold pressed into a compact. Because cooling times play an important role in determining particle configuration, the atomized metal droplets are sometimes rapidly cooled by falling into a water bath. Atomization and quench water are separated from the metal powder by gravity settling or filtration and discharged. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-250.

Table V-251 summarizes the analytical sampling data for priority

and selected conventional and nonconventional pollutants. Nine samples of metal powder production wet atomization wastewater were collected at five plants. Elevated concentrations of chromium (15.0 mg/l), copper (295.0 mg/l), nickel (81.0 mg/l), aluminum (5.3 mg/l), iron (13.3 mg/l) and TSS (2,127 mg/l) were detected in the samples.

Metal Powders Tumbling, Burnishing, or Cleaning Wastewater. As discussed in Section III, tumbling is an operation in which sintered parts pressed from metal powder are rotated in a barrel with ceramic or metal slugs or abrasives to remove scale, fins, or burrs. It may be done dry or with an aqueous solution. Burnishing is a surface finishing process in which minute surface irregularities are displaced rather than removed. It also can be done dry or in an aqueous solution. Pressed parts can be cleaned in hot soapy water to remove excess oil from oil quenching operations. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-252.

Table V-253 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Nine samples of tumbling, burnishing, and cleaning wastewater were collected from three streams at one plant. Elevated concentrations of copper (253 mg/l), lead (45.1 mg/l), zinc (9.56 mg/l), iron (211 mg/l), oil and grease (2,100 mg/l), and TSS (3,000 mg/l) were detected in the samples.

Metal Powders Sawing or Grinding Spent Neat Oils. As discussed in Section III, sawing or grinding operations may use mineral-based oils or heavy grease as the lubricant required to minimize friction and act as a coolant. Normally, saw oils are not discharged as a wastewater stream. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-254.

Since none of the plants surveyed reported discharging the sawing spent neat oils, no samples were collected.

Metal Powders Sawing or Grinding Spent Emulsions. As discussed in Section III, sawing or grinding operations generally require a lubricant in order to minimize friction and act as a coolant. Oil-in-water emulsions are commonly used as lubricants. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-255.

Table V-256 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Two samples of sawing or grinding emulsions were collected from two streams at one plant. Elevated concentrations of iron (176 mg/l), copper (1.55 mg/l), aluminum (7.00 mg/l), zinc (3.26 mg/l), boron (166 mg/l), cyanide (2.5 mg/l), oil and grease (720 mg/l), and TSS (120 mg/l) were detected in the samples.

Metal Powders Sawing or Grinding Contact Cooling Water. As discussed in Section III, a lubricant is frequently needed during sawing and grinding. Water, without additives, is one type of lubricant which may be used. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-257.

Table V-258 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of sawing or grinding contact cooling water was collected at one plant. Elevated concentrations of copper (230 mg/l), aluminum (40 mg/l) and magnesium (11 mg/l) were detected in this sample.

Metal Powders Sizing Spent Neat Oils. As discussed in Section III, sizing operations may use mineral-based oils or heavy grease as the lubricant required to minimize friction and act as a coolant. Normally, sizing oils are not discharged as a wastewater stream. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-259.

Since none of the plants surveyed reported discharging the sizing spent neat oils, no samples were collected.

Metal Powders Sizing Spent Emulsions. As discussed in Section III, sizing operations generally require a lubricant in order to minimize friction and act as a coolant. Oil-in-water emulsions are commonly used as lubricants. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-260.

Since none of the plants surveyed reported discharging the sizing spent emulsions, no samples were collected.

Metal Powders Steam Treatment Wet Air Pollution Control Blowdown. As discussed in Section III, steam treatment operations may require the use of wet air pollution control devices in order to meet air quality standards. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-261.

Table V-262 summarizes the analytical sampling data for priority and selected conventional and nonconventional pollutants. Three samples of steam treatment wet air pollution control blowdown were collected from one stream at one plant. Elevated concentrations of oil and grease (42 mg/l) and TSS (200 mg/l) were detected in the samples.

Metal Powders Oil-Resin Impregnation Spent Neat Oils. As discussed in Section III, porous parts pressed from metal powders may be impregnated with oils or resins. Normally, the oils or resins are not discharged as a wastewater stream. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-263.

Since none of the plants surveyed reported discharging the oils or resins, no samples were collected.

Metal Powders Degreasing Spent Solvents. As described in Section III, solvent cleaners are used to remove lubricants (oils and greases) applied to the surface of nonferrous metals during mechanical forming operations. Basic solvent cleaning methods include straight vapor degreasing, immersion-vapor degreasing, spray-vapor degreasing, ultrasonic vapor degreasing, emulsified solvent degreasing, and cold cleaning.

Solvents most commonly used for all types of vapor degreasing are trichloroethylene, 1,1,1-trichloroethane, methylene chloride, perchloroethylene, and various chlorofluorocarbons. Solvent selection depends on the required process temperature (solvent boiling point), product dimension, and metal characteristics. Contaminated vapor degreasing solvents are frequently recovered by distillation.

Since none of the plants surveyed reported discharging spent degreasing solvents, no samples were collected.

Metal Powders Hot Pressing Contact Cooling Water. As discussed in Section III, contact cooling water may be used to cool hot pressed parts in order to facilitate handling. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-264.

Table V-265 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of hot pressing contact cooling water was collected from one plant. Elevated concentrations of copper (2.2 mg/l), iron (6.3 mg/l), and magnesium (3.5 mg/l) were detected in this sample.

Metal Powders Mixing Wet Air Pollution Control Blowdown. As discussed in Section III, during the mixing of metal powders, particulates may become airborne. The use of wet air pollution control may be necessary in order to meet particulate air quality standards. Water use, wastewater discharge, and current recycle practices corresponding to this waste stream are summarized in Table V-266.

Table V-267 summarizes the analytical data for priority metal pollutants and selected conventional and nonconventional pollutants. One sample of mixing wet air pollution control blowdown was collected from one plant. Elevated concentrations of copper (1.2 mg/l) and magnesium (4.5 mg/l) were detected in this sample.

Metal Powders Operations Which Do Not Use Process Water. The Agency has not established a discharge allowance for operations which do not generate process wastewater. The following operations generate no process wastewater, because they use only noncontact cooling water or because they use no water at all:

Powder Metallurgy Operations (Compacting, Sintering)
Sanding
Rolling
Machining
Screening
Blending
Briquetting
Crushing, Pulverizing.

Treated Wastewater Samples. Tables V-268 through V-282 present the field sampling data for the treated wastewater from 18 of the 25 sampling episodes. Treated wastewater data for some of these plants were incorpo- rated into the larger data base which was used to determine the treatment effectiveness for different control systems. The treatability limits selected for the nonferrous metals forming control options are presented in Section VII (Control and Treatment Technology, Table VII-21 and VII-22, pp. 1474 and 1475).

Table V-1

NUMBER OF SAMPLES PER WASTE STREAM, BY SUBCATEGORY

Waste Stream	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Rolling Spent Neat Oils			*	*		*		*	*		0
Rolling Spent Neat Oils and Graphite-Based Lubricants					*						0
Rolling Spent Emulsions	1	*	4	3	*			*			8
Rolling Contact Cooling Water			8			1		2			11
Rolling Spent Soap Solutions	*										0
Drawing Spent Neat Oils	*		*	*		*					0
Drawing Spent Emulsions	*		1	1				*			2
Drawing Spent Lubricants					*				*		0
Drawing Spent Soap Solutions	1			1							2
Extrusion Spent Neat Oils						*					0
Extrusion Spent Emulsions						*					0
Extrusion Spent Lubricants			*		*		*		*		0
Extrusions Press and Solution Heat Treatment Contact Cooling Water	1		1								2
Extrusion Press Hydraulic Fluid Leakage	1		3		1	1			1		7
Extrusion Tool Contact Cooling Water							1				1
Swaging Spent Neat Oils									*		0
Swaging Spent Emulsions	1										1
Forging Spent Lubricants		*	*		*	*	*				0

Table V-1 (Continued)

NUMBER OF SAMPLES PER WASTE STREAM, BY SUBCATEGORY

Waste Stream	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Forging Contact Cooling Water		*	2		1	1					4
Forging Equipment Cleaning Wastewater		*	2			1					2
Forging Press Hydraulic Fluid Leakage			1			1					2
Tube Reducing Spent Lubricants			1			3			2		6
Metal Powder Production Wet Atomization Wastewater			7	*	3					9	19
Metal Powder Production Wastewater					*						0
Metal Powder Production Wet Air Pollution Control Blowdown										*	0
Metal Powder Production Floor Wash Wastewater					*						0
Continuous Strip Casting Contact Cooling Water	1										1
Semi-Continuous Ingot Casting Contact Cooling Water	2										2
Direct Chill Casting Contact Cooling Water		*		1				1			2
Shot Casting Contact Cooling Water	3			2							5
Stationary Casting Contact Cooling Water			1	*				*			1
Semi-Continuous and Continuous Casting Contact Cooling Water				2							2
Vacuum Melting Steam Condensate			1								1
Annealing and Solution Heat Treatment Contact Cooling			2					*			2
Heat Treatment Contact Cooling Water				3		5	3			5	16
Surface Treatment Spent Baths		3	4	2	1	3	1	1		3	18
Surface Treatment Rinsewater		12	25	7	5	9	3	1		3	61
Ammonia Rinsewater			1								1

Table V-1 (Continued)

NUMBER OF SAMPLES PER WASTE STREAM, BY SUBCATEGORY

Waste Stream	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Alkaline Cleaning Spent Baths	1		4	2	1	5		2	3		18
Alkaline Cleaning Rinsewater	4		5	*	*	4		1	1		15
Alkaline Cleaning Prebonding Wastewater				8							8
Molten Salt Rinsewater			8		6	1			*		14
Tumbling Wastewater						1					1
Tumbling, Burnishing Wastewater				4	6						10
Tumbling, Burnishing, and Cleaning Wastewater										9	9
Sawing, Grinding Spent Neat Oils				*	*	*			*	*	0
Sawing, Grinding Spent Emulsions	*	12	1	6		1	1		1	2	22
Sawing, Grinding Spent Emulsions and Synthetic Coolants						3					3
Sawing, Grinding Contact Cooling Water				2	1	*			*	1	4
Sawing, Grinding Rinsewater			*		2		*		1		3
Hydrostatic Tube Testing and Ultrasonic Testing Wastewater			*								0
Dye Penetrant Testing Wastewater			3		1	1					5
Inspection, Testing Wastewater									4		4
Equipment Cleaning Wastewater					3						3
Shot-Forming Wet Air Pollution Control Blowdown	1										1
Steam Cleaning Condensate			1								1
Area Cleaning Wastewater							3				3

Table V-1 (Continued)

NUMBER OF SAMPLES PER WASTE STREAM, BY SUBCATEGORY

Waste Stream	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Pressure Bonding Contact Cooling Water				1							1
Sizing Spent Neat Oils										*	0
Sizing Spent Emulsions										*	0
Steam Treatment Wet Air Pollution Control Blowdown										3	3
Oil-Resin Impregnation Spent Neat Oils										*	0
Miscellaneous Wastewater Sources					*	*					0
Degreasing Spent Solvents	*	*	*	*	*	*	*	*	1	*	1
Wet Air Pollution Control Blowdown		1	3	*	2	2	1		*		8
Degreasing Rinsewater								1	4		5
Drum Wash Water							1				1
Laundry Wash Water							1				1
Hot Pressing Contact Cooling Water										1	1
Mixing Wet Air Pollution Control Blowdown										1	1

*This waste stream was reported in dcp responses for plants in this subcategory, but no raw wastewater samples were analyzed.

**The number of samples by subcategory does not always add to the total number of samples because some sampled streams derive from operations in more than one subcategory.

The Roman numerials used to identify the columns refer to be following

I = Lead-Tin-Bismuth Forming

II = Magnesium Forming

III = Nickel-Cobalt Forming

IV = Precious Metals Forming

V = Refractory Metals Forming

VI = Titanium Forming

VII = Uranium Forming

VIII = Zinc Forming

IX = Zirconium Hafnium Forming

X = Metal Powders

XI = Total

Table V-2

SAMPLE ANALYSIS LABORATORIES

Laboratory	Pollutants Analyzed: Organics	Metals	Conventional	Nonconventional
ARO, Inc.; Tullahoma, TN			X	X
Arthur D. Little; Cambridge, MA	X			
CENTEC; Salem, VA		X		
Coors Spectro-Chemical; Golden, CO		X		
Edison Laboratory; Edison, NJ			X	X
EPA, Region III; Wheeling, WV		X	X	X
EPA-ESD, Region IV; Athens, GA		X	X	X
NUS Corp.; Pittsburgh, PA		X	X	X
Radian Corp.; Austin, TX		X	X	X
Radian Corp.; Sacramento, CA	X			
S-Cubed; San Diego, CA	X			
Versar, Inc.; Springfield, VA		X		
West Coast Technical Service, Inc.; Cerritos, CA	X			

Table V-3

NONPRIORITY POLLUTANTS ANALYZED FOR DURING SAMPLING EFFORT SUPPORTING THIS REGULATION

Conventional

total suspended solids (TSS)
oil and grease
pH

Nonconventional

acidity
alkalinity
aluminum
ammonia nitrogen
barium
biological oxygen demand (BOD)
boron
calcium
chemical oxygen demand (COD)
chloride
cobalt
columbium
fluoride
gold
iron
magnesium
manganese
molybdenum
nitrate
phenolics
phosphate
phosphorus
sodium
sulfate
tantalum
tin
titanium
total dissolved solids (TDS)
total organic carbon (TOC)
total solids (TS)
tungsten
uranium
vanadium
yttrium
zirconium

Table V-3 (Continued)

NONPRIORITY POLLUTANTS ANALYZED FOR DURING SAMPLING EFFORT SUPPORTING THIS REGULATION

Nonconventional (Cont.)

radium-226
gross alpha
gross beta

Table V-4

RESULTS OF CHEMICAL ANALYSES OF SAMPLED
LEAD AND NICKEL EXTRUSION PRESS AND SOLUTION HEAT TREATMENT
CONTACT COOLING WATER

Parameter	Lead (mg/l)	Nickel (mg/l)	Treatment Effectiveness LS&F Technology (mg/l)*
Oil and Grease	3	7	10
TSS	5	3	2.6
pH	7.6	7.4	
Antimony	--**	--	0.47
Arsenic	--	--	0.34
Beryllium	0.001	--	0.20
Cadmium	0.005	--	0.049
Chromium	--	--	0.07
Copper	0.024	0.05	0.39
Lead	0.13	--	0.08
Nickel	0.007	0.14	0.22
Silver	--	--	0.07
Zinc	--	0.07	0.23
Cyanide	0.08	--	0.047
Acidity	--	--	
Alkalinity	170	55	
Aluminum	--	--	1.49
Ammonia	0.08	0.13	32.2
Fluoride	0.22	0.83	9.67
Iron	0.023	--	0.28
Magnesium	--	--	
Sulfate	--	--	
Titanium	0.084	00	
Total Dissolved Solids	--	--	

*From Table VII-21.

**Not found above analytical quantification level or level detected in source water.

Table V-5

RESULTS OF CHEMICAL ANALYSES OF SAMPLED
LEAD, NICKEL, AND PRECIOUS METALS ROLLING SPENT EMULSIONS

Parameter	Lead (mg/l)	Nickel (mg/l)	Precious Metals (mg/l)	Effectiveness LS&F Technology (mg/l)*
Oil and Grease	270	3,055	587	10
TSS	480	4,870	242	2.6
pH	7.92	5.96	5.48	
Antimony	--**	0.003	0.049	0.47
Arsenic	--	0.013	0.011	0.34
Beryllium	--	--	--	0.20
Cadmium	--	0.02	0.06	0.049
Chromium	--	3.23	0.03	0.07
Copper	0.25	2.93	8.72	0.39
Lead	29	3.13	0.49	0.08
Nickel	0.003	21.9	0.36	0.22
Silver	--	0.006	0.07	0.07
Zinc	1.4	5.55	2.16	0.23
Cyanide	--	--	--	0.047
Acidity	--	--	3.3	
Alkalinity	310	280	1,170	
Aluminum	0.35	1.28	0.15	1.49
Ammonia	0.12	2.15	0.16	32.2
Fluoride	0.82	4.55	0.96	9.67
Iron	7.3	59.6	9.73	0.28
Magnesium	--	--	--	
Sulfate	59	370	3,140	
Total Dissolved Solids	1,020	5,400	16,000	
Chemical Oxygen Demand	15,000	52,300	367	
Total Organic Carbon	1,700	12,300	7,730	

*From Table VII-21.

**Not found above analytical quantification level or level detected in source water.

Table V-6

LEAD-TIN-BISMUTH ROLLING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	1,001	240.0	P	0.37	0.09
2	10,170	2,440	P	27.94	6.70
3	10,170	2,440	P	27.94	6.70
4	10,170	2,440	P	27.94	6.70
5	10,170	2,440	P	27.94	6.70
6	10,170	2,440	P	27.94	6.70
7	NR	NR	NR	NR	NR
Average	8,642	2,073		23.35	5.60

P - Periodic discharge
NR - Data not reported

Table V-7

LEAD-TIN-BISMUTH ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
6. carbon tetrachloride	A-3	1		0.006		
11. 1,1,1-trichloroethane	A-3	1		0.007		
15. 1,1,2,2-tetrachloroethane	A-3	1		0.019		
23. chloroform	A-3	1		0.006		
38. ethylbenzene	A-3	1		0.012		
114. antimony	A-3	1	<0.003	<0.003		
115. arsenic	A-3	1	<0.003	<0.003		
117. beryllium	A-3	1	<0.005	<0.005		
118. cadmium	A-3	1	<0.002	<0.002		
119. chromium (total)	A-3	1	<0.001	<0.001		
120. copper	A-3	1	<0.001	0.25		
122. lead	A-3	1	<0.084	29		
123. mercury	A-3	1		<0.0002		
124. nickel	A-3	1	<0.003	0.003		
125. selenium	A-3	1		<0.003		
126. silver	A-3	1		<0.005		
127. thallium	A-3	1		<0.002		
128. zinc	A-3	1	0.72	1.4		
Nonconventional Pollutants						
Acidity	A-3	1		<1		
Alkalinity	A-3	1		310		

Table V-7 (Continued)

LEAD-TIN-BISMUTH ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Aluminum	A-3	1	<0.050	0.35		
Ammonia Nitrogen	A-3	1		0.12		
Barium	A-3	1	0.15	0.009		
Boron	A-3	1	<0.009	<0.009		
Calcium	A-3	1	69	67		
Chemical Oxygen Demand (COD)	A-3	1		15,000		
Chloride	A-3	1		50		
Cobalt	A-3	1	<0.006	<0.006		
Fluoride	A-3	1		0.82		
Iron	A-3	1	<0.08	7.3		
Magnesium	A-3	1	27	16		
Manganese	A-3	1	<0.001	0.053		
Molybdenum	A-3	1	<0.002	<0.002		
Phosphate	A-3	1		59		
Sodium	A-3	1	10	88		
Sulfate	A-3	1		59		
Tin	A-3	1	<0.12	<0.12		
Titanium	A-3	1	<0.005	<0.005		
Total Dissolved Solids (TDS)	A-3	1		1,020		
Total Organic Carbon (TOC)	A-3	1		1,700		
Total Solids (TS)	A-3	1		3,800		
Vanadium	A-3	1	<0.003	<0.003		

Table V-7 (Continued)

LEAD-TIN-BISMUTH ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	A-3	1	<0.002	<0.002		
Conventional Pollutants						
Oil and Grease	A-3	1	<1	270		
Total Suspended Solids (TSS)	A-3	1	23	480		
pH (standard units)	A-3	1		7.92		

1. The following toxic pollutants were not detected in this waste stream: 1-5, 7-10 12-14, 16-22, 24-37, and 39-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, 121, and 129.

Table V-8

LEAD-TIN-BISMUTH ROLLING SPENT SOAP SOLUTIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	43.0	10.3	0.0	43.0	10.3
Average	43.0	10.3		43.0	10.3

Table V-9

LEAD-TIN-BISMUTH DRAWING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	100	0.00	0.00
3	NR	NR	P	NR	NR
Average	NR	NR		0.00	0.00

P - Periodic discharge
NR - Data not reported

Table V-10

LEAD-TIN-BISMUTH DRAWING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
3	181.8	43.60	100	0.00	0.00
3	487.9	117.0	100	0.00	0.00
4	24,520	5,880	100	0.00	0.00
5	NR	NR	100	0.00	0.00
6	26.27	6.30	P	26.27	6.30
1	NR	NR	P	NR	NR
1	NR	NR	P	NR	NR
2	NR	NR	P	NR	NR
Average	6,304	1,512		26.27	6.30

P - Periodic discharge
NR - Data not reported

Table V-11

LEAD-TIN-BISMUTH DRAWING SPENT SOAP SOLUTIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
2	7.46	1.79	P	7.46	1.79
Average	7.46	1.79		7.46	1.79

P - Periodic discharge
NR - Data not reported

Table V-12

LEAD-TIN-BISMUTH DRAWING SPENT SOAP SOLUTIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	AZ-1		-	21.0		
117. beryllium	AZ-1		-	1.0		
118. cadmium	AZ-1		-	1.0		
119. chromium (total)	AZ-1		-	1.0		
120. copper	AZ-1		-	11.0		
122. lead	AZ-1		-	3,100.0		
124. nickel	AZ-1		-	1.0		
126. silver	AZ-1		-	1.0		
128. zinc	AZ-1		-	230.0		
Nonconventional Pollutants						
Tin	AZ-1		-	1,600.0		
Conventional Pollutants						
Oil and Grease	AZ-1		-	353,000.0		
Total Suspended Solids (TSS)	AZ-1		-	294,000.0		
pH	AZ-1		-	9.2		

1. No analyses were performed on the following toxic pollutants: 1 through 113, 115, 116, 121, 123, 125 and 127.

Table V-13

LEAD-TIN-BISMUTH
EXTRUSION PRESS OR SOLUTION HEAT TREATMENT CONTACT
COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	92.56	22.20	100	0.00	0.00
1	60.05	14.40	100	0.00	0.00
2	3.34	0.80	100	0.00	0.00
3	78.65	18.86	0.0	78.65	18.86
4	102.5	24.58	0.0	102.5	24.58
5	117.6	28.19	0.0	117.6	28.19
6	200.2	48.00	0.0	200.2	48.00
7	325.3	78.00	0.0	325.3	78.00
8	NR	NR	NR	740.6	177.6
9	1,024	245.6	0.0	1,024	245.6
8	NR	NR	NR	1,111	266.4
10	1,405	337.0	0.0	1,405	337.0
11	1,784	427.9	0.0	1,784	427.9
4	2,340	561.1	0.0	2,340	561.1
12	7,064	1,694	0.0	7,064	1,694
13	NR	NR	0.0	NR	NR
14	2,085	500.0	P	NR	NR
Average	1,192	285.8		1,358	325.6

P - Periodic discharge
NR - Data not reported

Table V-14

LEAD-TIN-BISMUTH EXTRUSIONS PRESS AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
4. benzene	C-2	1	0.002	0.004		
23. chloroform	C-2	1	0.073	0.051		
44. methylene chloride	C-2	1	0.011	ND		
114. antimony	C-2	1	<0.003	<0.003		
115. arsenic	C-2	1	<0.003	<0.003		
117. beryllium	C-2	1	<0.005	0.001		
118. cadmium	C-2	1	0.006	0.005		
119. chromium (total)	C-2	1	4.0	4.6		
120. copper	C-2	1	<0.001	0.024		
121. cyanide (total)	C-2	1	0.071	0.08		
122. lead	C-2	1	<0.084	0.13		
123. mercury	C-2	1	<0.0002	<0.0002		
124. nickel	C-2	1	<0.003	0.007		
125. selenium	C-2	1	<0.003	<0.003		
126. silver	C-2	1	<0.001	<0.001		
127. thallium	C-2	1	<0.002	<0.002		
128. zinc	C-2	1	<0.003	<0.003		
Nonconventional Pollutants						
Acidity	C-2	1	<1	<1		
Alkalinity	C-2	1	169	170		
Aluminum	C-2	1	<0.050	<0.050		

Table V-14 (Continued)

LEAD-TIN-BISMUTH EXTRUSIONS PRESS AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	C-2	1	0.11	0.08		
Barium	C-2	1	0.13	0.13		
Boron	C-2	1	0.34	0.60		
Calcium	C-2	1	110	110		
Chemical Oxygen Demand (COD)	C-2	1	<5	<5		
Chloride	C-2	1	120	660		
Cobalt	C-2	1	<0.006	0.007		
Fluoride	C-2	1	0.17	0.22		
Iron	C-2	1	0.025	0.023		
Magnesium	C-2	1	24	24		
Manganese	C-2	1	0.51	0.22		
Molybdenum	C-2	1	<0.002	0.012		
Phenolics	C-2	1	0.69	<0.005		
Phosphate	C-2	1	<4	10		
Sodium	C-2	1	66	67		
Sulfate	C-2	1	290	290		
Tin	C-2	1	<0.12	<0.12		
Titanium	C-2	1	<0.005	0.084		
Total Dissolved Solids (TDS)	C-2	1	800	770		
Total Organic Carbon (TOC)	C-2	1	2	<1		
Total Solids (TS)	C-2	1	810	800		
Vanadium	C-2	1	0.025	0.093		

Table V-14 (Continued)

LEAD-TIN-BISMUTH EXTRUSIONS PRESS AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	C-2	1	<0.002	0.007		
Conventional Pollutants						
Oil	C-2	1	4	3		
Total Suspended Solids (TSS)	C-2	1	9	5		
pH (standard units)	C-2	1	7.30	7.60		

1. The following toxic pollutants were not detected in this waste stream: 1-3, 5-22, 24-43, and 45-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-15

LEAD-TIN-BISMUTH EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	NR	55.02	13.19
Average	NR	NR		55.02	13.19

NR - Data not reported

Table V-16

LEAD-TIN-BISMUTH SWAGING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	100	0.00	0.00
3	2.93	0.70	100	0.00	0.00
3	1.77	0.42	P	1.77	0.42
Average	2.35	0.56		1.77	0.42

P - Periodic discharge
NR - Data not reported

Table V-17

LEAD-TIN-BISMUTH CONTINUOUS STRIP CASTING
CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	5,080	1,218	P	1.00	0.24
2	5,080	1,218	P	1.00	0.24
3	5,080	1,218	P	1.00	0.24
4	5,080	1,218	P	1.00	0.24
5	5,080	1,218	P	1.00	0.24
Average	5,080	1,218		1.00	0.24

P - Periodic discharge

Table V-18

LEAD-TIN-BISMUTH CONTINUOUS STRIP CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	A-2	1	<0.005	<0.005		
118. cadmium	A-2	1	<0.002	0.012		
119. chromium (total)	A-2	1	<0.001	0.009		
120. copper	A-2	1	<0.001	0.41		
122. lead	A-2	1	<0.084	1.2		
124. nickel	A-2	1	<0.003	0.13		
128. zinc	A-2	1	0.72	3.1		
Nonconventional Pollutants						
Aluminum	A-2	1	<0.050	0.54		
Barium	A-2	1	0.15	0.001		
Boron	A-2	1	<0.009	0.056		
Calcium	A-2	1	69	4.6		
Cobalt	A-2	1	<0.006	0.018		
Iron	A-2	1	<0.008	3.5		
Magnesium	A-2	1	27	0.91		
Manganese	A-2	1	<0.001	0.055		
Molybdenum	A-2	1	<0.002	0.006		
Sodium	A-2	1	10	160		
Tin	A-2	1	<0.12	<0.12		
Titanium	A-2	1	<0.005	0.010		
Vanadium	A-2	1	<0.003	0.011		

Table V-18 (Continued)

LEAD-TIN-BISMUTH CONTINUOUS STRIP CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	A-2	1	<0.002	0.002		
Conventional Pollutants						
Oil and Grease	A-2	1	<1	6		
Total Suspended Solids (TSS)	A-2	1	23	8		
pH (standard units)	A-2	1		8		

1. No analyses were performed on the following toxic pollutants: 1-116, 121, and 129.

Table V-19

LEAD-TIN-BISMUTH
SEMI-CONTINUOUS INGOT CASTING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	29.36	7.04	0.0	29.36	7.04
2	NR	NR	0.0	NR	NR
3	NR	NR	NR	NR	NR
Average	29.36	7.04		29.36	7.04

NR - Data not reported

Table V-20

LEAD-TIN-BISMUTH SEMI-CONTINUOUS INGOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	B-3	1	0.003	ND	ND	
28. 3,3'-dichlorobenzidine	B-3	2	0.039	ND	ND	
72. benzo(a)anthracene	B-3	2	0.061	ND	ND	
114. antimony	B-3	2	<0.010	0.290	0.180	
115. arsenic	B-3	2	<0.010	0.030	0.020	
117. beryllium	B-3	2	<0.005	<0.005	<0.005	
118. cadmium	B-3	2	<0.020	<0.020	<0.020	
119. chromium (total)	B-3	2	<0.020	<0.020	<0.020	
120. copper	B-3	2	≤0.0050	<0.050	<0.050	
121. cyanide (total)	B-3	1	<0.02	<0.02	<0.02	
122. lead	B-3	2	<0.050	1.10	0.850	
123. mercury	B-3	2	<0.0002	<0.0002	<0.0002	
124. nickel	B-3	2	<0.050	<0.050	<0.050	
125. selenium	B-3	2	<0.010	<0.010	<0.010	
126. silver	B-3	2	<0.010	<0.010	<0.010	
127. thallium	B-3	2	<0.010	<0.010	<0.010	
128. zinc	B-3	2	<0.020	0.060	0.060	
Nonconventional Pollutants						
Acidity	B-3	2	<1	<1	<1	
Alkalinity	B-3	2	240	220	210	
Aluminum	B-3	2	<0.100	<0.100	<0.100	

Table V-20 (Continued)

LEAD-TIN-BISMUTH SEMI-CONTINUOUS INGOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	B-3	2	<1	<1	<1	
Barium	B-3	2	<0.050	0.100	0.100	
Boron	B-3	2	<0.100	<0.100	<0.100	
Calcium	B-3	2	62.0	54.8	55.7	
Chemical Oxygen Demand (COD)	B-3	2	<5	6.5	<5	
Chloride	B-3	2	6	23	23	
Cobalt	B-3	2	<0.050	<0.050	<0.050	
Fluoride	B-3	2	1.2	0.26	0.27	
Iron	B-3	2	1.00	0.800	0.550	
Magnesium	B-3	2	19.7	17.1	17.4	
Manganese	B-3	2	0.100	<0.050	<0.050	
Molybdenum	B-3	2	<0.050	<0.050	<0.050	
Phenolics	B-3	1	0.010	0.007	<0.005	
Phosphate	B-3	2	56	<4	<4	
Sodium	B-3	2	6.80	21.7	21.0	
Sulfate	B-3	2	7.8	5.1	11	
Tin	B-3	2	<0.050	<0.050	<0.050	
Titanium	B-3	2	<0.050	<0.050	<0.050	
Total Dissolved Solids (TDS)	B-3	2	390	224	370	
Total Organic Carbon (TOC)	B-3	2	12	<1	9	
Total Solids (TS)	B-3	2	490	230	470	
Vanadium	B-3	2	<0.050	<0.050	<0.050	

Table V-20 (Continued)

LEAD-TIN-BISMUTH SEMI-CONTINUOUS INGOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	B-3	2	<0.050	<0.050	<0.050	
Conventional Pollutants						
Oil and Grease	B-3	1	15	4	<1	
Total Suspended Solids (TSS)	B-3	2	110	<1	80	
pH (standard units)	B-3	2	7.43	8.20	7.82	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-27, 29-71, and 73-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-21

LEAD-TIN-BISMUTH SHOT CASTING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	0.00	0.00
2	NR	NR	P	33.82	8.11
3	40.84	9.79	P	40.84	9.79
Average	40.84	9.79		37.33	8.95

P - Periodic discharge
NR - Data not reported

Table V-22

LEAD-TIN-BISMUTH SHOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
28. 3,3'-dichlorobenzidine	B-2	1	0.039	ND	ND	ND
65. phenol	B-2	1	ND	ND	0.026	0.069
114. antimony	B-2	1	<0.010	2.80	2.80	3.30
115. arsenic	B-2	1	<0.010	0.160	0.060	0.080
117. beryllium	B-2	1	<0.005	<0.005	<0.005	<0.005
118. cadmium	B-2	1	<0.020	<0.020	<0.020	<0.020
119. chromium (total)	B-2	1	<0.020	<0.020	<0.020	<0.020
120. copper	B-2	1	<0.050	<0.050	<0.050	<0.050
121. cyanide (total)	B-2	1	<0.02	<0.02	<0.02	<0.02
122. lead	B-2	1	<0.050	52.2	17.0	15.6
123. mercury	B-2	1	<0.0002	0.0060	0.0062	0.0093
124. nickel	B-2	1	<0.050	<0.050	<0.050	<0.050
125. selenium	B-2	1	<0.010	<0.010	<0.010	<0.010
126. silver	B-2	1	<0.010	<0.010	<0.010	<0.010
127. thallium	B-2	1	<0.010	<0.010	<0.010	<0.010
128. zinc	B-2	1	<0.020	0.120	0.120	<0.010
Nonconventional Pollutants						
Acidity	B-2	1	<1	<1	<1	<1
Alkalinity	B-2	1	240	400	300	370
Aluminum	B-2	1	<0.100	<0.100	<0.100	<0.100

Table V-22 (Continued)

LEAD-TIN-BISMUTH SHOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	B-2	1	<1	<1	<1	0.36
Barium	B-2	1	<0.050	0.200	0.150	0.150
Boron	B-2	1	<0.100	0.100	0.100	0.100
Calcium	B-2	1	62.0	88.6	73.0	82.5
Chemical Oxygen Demand (COD)	B-2	1	<5	2,700	1,560	2,840
Chloride	B-2	1	6	64	47	75
Cobalt	B-2	1	<0.050	<0.050	<0.050	<0.050
Fluoride	B-2	1	1.2	0.40	0.33	0.88
Iron	B-2	1	1.00	2.10	2.50	1.20
Magnesium	B-2	1	19.7	52.2	21.9	24.0
Manganese	B-2	1	0.100	0.050	<0.050	<0.050
Molybdenum	B-2	1	<0.050	<0.050	<0.050	<0.050
Phenolics	B-2	1	0.010	0.115	0.10	0.090
Phosphate	B-2	1	56	<4	<4	<4
Sodium	B-2	1	6.8	133	90.5	127
Sulfate	B-2	1	7.80	200	180	270
Tin	B-2	1	<0.050	10.5	6.20	10.4
Titanium	B-2	1	<0.050	<0.050	<0.050	<0.050
Total Dissolved Solids (TDS)	B-2	1	390	1,500	920	910
Total Organic Carbon (TOC)	B-2	1	12	530	340	560
Total Solids (TS)	B-2	1	490	1,730	1,490	2,100
Vanadium	B-2	1	<0.050	<0.050	<0.050	<0.050

Table V-22 (Continued)

LEAD-TIN-BISMUTH SHOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	B-2	1	<0.050	<0.050	<0.050	<0.050
Conventional Pollutants						
Oil and Grease	B-2	1	15	14	9	22
Total Suspended Solids (TSS)	B-2	1	110	210	420	230
pH (standard units)	B-2	1	7.43	9.20	8.82	8.93

1. No analyses were performed on the following toxic pollutants: 2-4, 6, 7, 10, 11, 13-17, 19, 23, 29, 30, 32, 33, 38, 44-51, 85-113, 116, and 129.

2. The following toxic pollutants were not detected in this waste stream: 1, 5, 8, 9, 12, 18, 20, 21, 22, 24, 25-27, 31, 34-37, 39-43, 52-64, and 66-84.

Table V-23

LEAD-TIN-BISMUTH
SHOT-FORMING WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	588	141	0.0	588	141
Average	588	141		588	141

Table V-24

LEAD-TIN-BISMUTH
ALKALINE CLEANING SPENT BATHS

Plant	Water Discharge L/kkg	Water Discharge gal/ton
1	17.95	4.30
2	40.55	9.72
3	48.18	11.55
3	120.1	28.81
4	196.0	47.00
4	294.0	70.50
Average	119.5	28.65

Table V-25

LEAD-TIN-BISMUTH ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
22. p-chloro-m-cresol	B-4	1	ND	0.040		
28. 3,3'-dichlorobenzidine	B-4	1	0.039	ND		
66. bis(2-ethylhexyl) phthalate	B-4	1	ND	0.077		
72. benzo(a)anthracene	B-4	1	0.061	ND		
81. phenanthrene	B-4	1	ND	0.046		
114. antimony	B-4	1	<0.010	7.30		
115. arsenic	B-4	1	<0.010	0.150		
117. beryllium	B-4	1	<0.005	<0.005		
118. cadmium	B-4	1	<0.020	<0.020		
119. chromium (total)	B-4	1	<0.020	<0.020		
120. copper	B-4	1	<0.050	0.150		
121. cyanide (total)	B-4	1	<0.02	<0.02		
122. lead	B-4	1	<0.050	183		
123. mercury	B-4	1	<0.0002	<0.0002		
124. nickel	B-4	1	<0.050	<0.050		
125. selenium	B-4	1	<0.010	<0.020		
126. silver	B-4	1	<0.010	<0.010		
127. thallium	B-4	1	<0.010	<0.010		
128. zinc	B-4	1	<0.020	0.160		

Table V-25 (Continued)

LEAD-TIN-BISMUTH ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	B-4	1	<1	<1		
Alkalinity	B-4	1	240	850		
Aluminum	B-4	1	<0.100	0.200		
Ammonia Nitrogen	B-4	1	<1	<1		
Barium	B-4	1	<0.050	<0.150		
Boron	B-4	1	<0.100	0.200		
Calcium	B-4	1	62.0	64.1		
Chemical Oxygen Demand (COD)	B-4	1	<5	71		
Chloride	B-4	1	6	39		
Cobalt	B-4	1	<0.050	<0.050		
Fluoride	B-4	1	1.2	0.34		
Iron	B-4	1	1.00	1.15		
Magnesium	B-4	1	19.7	24.8		
Manganese	B-4	1	0.100	0.100		
Molybdenum	B-4	1	<0.050	<0.050		
Phenolics	B-4	1	0.010	0.030		
Phosphate	B-4	1	56	580		
Sodium	B-4	1	6.80	906		
Sulfate	B-4	1	7.8	60		
Tin	B-4	1	<0.050	<0.050		
Titanium	B-4	1	<0.050	<0.050		
Total Dissolved Solids (TDS)	B-4	1	390	3,500		

Table V-25 (Continued)

LEAD-TIN-BISMUTH ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Organic Carbon (TOC)	B-4	1	12	46		
Total Solids (TS)	B-4	1	490	4,000		
Vanadium	B-4	1	<0.050	<0.050		
Yttrium	B-4	1	<0.050	<0.050		
Conventional Pollutants						
Oil and Grease	B-4	1	15	600		
Total Suspended Solids (TSS)	B-4	1	110	560		
pH (standard units)	B-4	1	7.43	8.31		

1. No analyses were performed on the following toxic pollutants: 2-4, 6, 7, 10, 11, 13-17, 19, 23, 29, 30, 32, 33, 38, 44-51, 85-113, 116, and 129.

2. The following toxic pollutants were not detected in this waste stream: 1, 5, 8, 9, 12, 18, 20, 21, 24-27, 31, 34-37, 39-43, 52-65, 67-71, 73-80, and 82-84.

Table V-26

LEAD-TIN-BISMUTH ALKALINE CLEANING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	48.4	11.6	0.0	48.4	11.6
2	371	89.0	0.0	371	89.0
3	4,300	1,030	0.0	4,300	1,030
1	4,710	1,130	0.0	4,710	1,130
Average	2,357	565		2,357	565

Table V-27

LEAD-TIN-BISMUTH ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
28. 3,3'-dichlorobenzidine	B-5	2	0.039	ND	ND	ND
	B-6	1	0.039			ND
72. benzo(a)anthracene	B-5	2	0.061	ND	ND	ND
	B-6	1	0.061			ND
114. antimony	B-5	2	<0.010	0.440	0.650	0.650
	B-6	1	<0.010			1.10
115. arsenic	B-5	2	<0.010	<0.010	0.010	0.010
	B-6	1	<0.010			0.020
117. beryllium	B-5	2	<0.005	<0.005	<0.005	<0.005
	B-6	1	<0.005			<0.005
118. cadmium	B-5	2	<0.020	<0.020	<0.020	<0.020
	B-6	1	<0.020			<0.020
119. chromium (total)	B-5	2	<0.020	<0.020	<0.020	<0.020
	B-6	1	<0.020			<0.020
120. copper	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			0.300
121. cyanide (total)	B-5	1	<0.02	<0.02	<0.02	<0.02
	B-6	1	<0.02			<0.02
122. lead	B-5	2	<0.050	9.55	8.85	15.8
	B-6	1	<0.050			40.8
123. mercury	B-5	2	<0.0002	<0.0002	0.005	<0.0002
	B-6	1	<0.0002			0.0007
124. nickel	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			<0.050
125. selenium	B-5	2	<0.010	<0.010	<0.010	<0.010
	B-6	1	<0.010			<0.010
126. silver	B-5	2	<0.010	<0.010	<0.010	<0.010
	B-6	1	<0.010			<0.010

Table V-27 (Continued)

LEAD-TIN-BISMUTH ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
127. thallium	B-5	2	<0.010	<0.010	<0.010	<0.010
	B-6	1	<0.010			<0.010
128. zinc	B-5	2	<0.020	<0.020	<0.020	<0.020
	B-6	1	<0.020			0.160
Nonconventional Pollutants						
Acidity	B-5	2	<1	<1	<1	<1
	B-6	1	<1			<1
Alkalinity	B-5	2	240	290	300	630
	B-6	1	240			600
Aluminum	B-5	2	<0.100	<0.100	<0.100	<0.100
	B-6	1	<0.100			0.100
Ammonia Nitrogen	B-5	2	<1	<1	<1	0.44
	B-6	1	<1			0.84
Barium	B-5	2	<0.050	0.100	0.100	0.050
	B-6	1	<0.050			0.100
Boron	B-5	2	<0.100	<0.100	<0.100	<0.100
	B-6	1	<0.100			<0.100
Calcium	B-5	2	62.0	45.9	37.5	27.7
	B-6	1	62.0			32.1
Chemical Oxygen Demand (COD)	B-5	2	<5	48	<5	78
	B-6	1	<5			42
Chloride	B-5	2	6	48	21	18
	B-6	1	6			31
Cobalt	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			<0.050
Fluoride	B-5	2	1.2	0.28	0.28	0.57
	B-6	1	1.2			
Iron	B-5	2	1.00	0.600	0.350	0.400
	B-6	1	1.00			0.650

Table V-27 (Continued)

LEAD-TIN-BISMUTH ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Magnesium	B-5	2	19.7	14.1	12.1	10.4
	B-6	1	19.7			11.5
Manganese	B-5	2	0.100	<0.050	<0.050	<0.050
	B-6	1	0.100			<0.050
Molybdenum	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			<0.050
Phenolics	B-5	1	0.010	<0.005	<0.005	<0.005
	B-6	1	0.010			<0.005
Phosphate	B-5	2	56	8.6	13	130
	B-6	1	56			<4
Sodium	B-5	2	6.80	70.0	95.3	253
	B-6	1	6.80			221
Sulfate	B-5	2	7.8	5.7	14	<0.5
	B-6	1	7.8			<0.5
Tin	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			<0.050
Titanium	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			<0.050
Total Dissolved Solids (TDS)	B-5	2	390	370	520	730
	B-6	1	390			730
Total Organic Carbon (TOC)	B-5	2	12	21	22	25
	B-6	1	12			125
Total Solids (TS)	B-5	2	490	386	810	1,060
	B-6	1	490			1,140
Vanadium	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			<0.050
Yttrium	B-5	2	<0.050	<0.050	<0.050	<0.050
	B-6	1	<0.050			<0.050

Table V-27 (Continued)

LEAD-TIN-BISMUTH ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	B-5	1	15	5	9	13
	B-6	1	15			12
Total Suspended Solids (TSS)	B-5	2	110	<1	160	260
	B-6	1	110			200
pH (standard units)	B-5	2	7.43	9.50	9.21	9.82
	B-6	1	7.43			10.0

1. No analyses were performed on the following toxic pollutants: 2-4, 6, 7, 10, 11, 13-17, 19, 23, 29, 30, 32, 33, 38, 44-51, 85-113, 116, and 129.

2. The following toxic pollutants were not detected in this waste stream: 1, 5, 8, 9, 12, 18, 20-22, 24-27, 31, 34-37, 39-43, 52-71, and 73-84.

Table V-28

MAGNESIUM ROLLING SPENT EMULSIONS

Plant	Water Use 1/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge 1/kkg	Wastewater Discharge gal/ton
1	40,000	9,600	(P)	NR (CH)	NR (CH)
	107,000	25,600	(P)	NR (CH)	NR (CH)

CH - Contract hauled
P - Periodic discharge
NR - Data not reported

Table V-29

MAGNESIUM FORGING SPENT LUBRICANTS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	2.11	0.505	0 (+)	0	0
2	6.80	1.63	0 (+)	0	0
3	105	25.1	0 (+)	0	0
4	NR	NR	0 (+)	0	0

+ - Loss due to evaporation, consumption, and drag-out
NR - Data not reported

Table V-30

MAGNESIUM FORGING CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100 (+)	0	0
2	318	76.2	0	318	76.2
3	6,550	1,570	0 (+)	5,460	1,310

NR - Data not reported
\+ - Loss due to evaporation

Table V-31

MAGNESIUM FORGING EQUIPMENT CLEANING WASTEWATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	13.7	3.28	0	13.7	3.28
	66.1	15.9	0	66.1	15.9

Table V-32

MAGNESIUM DIRECT CHILL CASTING CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	8,340	2,000	100	0	0
2	3,950	947	0	3,950	947

Table V-33

MAGNESIUM SURFACE TREATMENT SPENT BATHS

Plant	Wastewater l/kkg	Wastewater gal/ton
1	NR	NR
	NR	NR
	NR	NR
	NR	NR
2	NR (CH)	NR (CH)
	NR (CH)	NR (CH)
3	122	29.3
	380	91.1
	897	215

CH - Contract hauled
NR - Data not reported

Table V-34

MAGNESIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	Q-2	1	<0.010			<0.100
	Q-5	1	<0.010			0.050
	Q-18	1	<0.010			<0.020
115. arsenic	Q-5	1	<0.010			<0.010
	Q-18	1	<0.010			<0.040
117. beryllium	Q-2	1	<0.005			0.010
	Q-5	1	<0.005			0.300
	Q-18	1	<0.005			<0.500
118. cadmium	Q-2	1	<0.020			<0.050
	Q-5	1	<0.020			<0.200
	Q-18	1	<0.020			<0.020
119. chromium (total)	Q-2	1	<0.020			0.350
	Q-5	1	<0.020			1.80
	Q-18	1	<0.020			83,600
120. copper	Q-2	1	<0.050			<0.100
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<50.0
121. cyanide (total)	Q-2	1	<0.02			0.06
	Q-5	1	<0.02			0.24
	Q-18	1	<0.02			0.03
122. lead	Q-2	1	<0.050			<0.100
	Q-5	1	<0.050			0.500
	Q-18	1	<0.050			<50.0
123. mercury	Q-2	1	<0.0002			0.0002
	Q-5	1	<0.0002			<0.0002
	Q-18	1	<0.0002			<0.004
124. nickel	Q-2	1	<0.050			<0.200
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<50.0
125. selenium	Q-2	1	<0.010			<0.050
	Q-5	1	<0.010			<0.010
	Q-18	1	<0.010			<0.050

Table V-34 (Continued)

MAGNESIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	Q-2	1	<0.010			<0.010
	Q-5	1	<0.010			<0.010
	Q-18	1	<0.010			0.020
127. thallium	Q-2	1	<0.010			<0.040
	Q-5	1	<0.010			<0.020
	Q-18	1	<0.010			<0.010
128. zinc	Q-2	1	<0.040			8.00
	Q-5	1	<0.040			138
	Q-18	1	<0.040			120
Nonconventional Pollutants						
Acidity	Q-2	1	<1			<1
	Q-5	1	<1			180
	Q-18	1	<1			15,000
Alkalinity	Q-2	1	160			27,000
	Q-5	1	160			<1
	Q-18	1	160			<1
Aluminum	Q-2	1	<0.100			6.00
	Q-5	1	<0.100			86.0
	Q-18	1	<0.100			100
Ammonia Nitrogen	Q-2	1	0.4			0.3
	Q-5	1	0.4			58
	Q-18	1	0.4			97
Barium	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<50.0
Boron	Q-2	1	0.300			16.0
	Q-5	1	0.300			1.00
	Q-18	1	0.300			<100
Calcium	Q-2	1	3.70			<1.00
	Q-5	1	3.70			27.0
	Q-18	1	3.70			300

Table V-34 (Continued)

MAGNESIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	Q-2	1	500			2,500
	Q-5	1	500			>250,000
	Q-18	1	500			<10
Chloride	Q-2	1	7			7
	Q-5	1	7			400
	Q-18	1	7			<1
Cobalt	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<50.0
Fluoride	Q-2	1	0.3			1.8
	Q-5	1	0.3			1.6
	Q-18	1	0.3			126
Iron	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			3.50
	Q-18	1	<0.050			<50.0
Magnesium	Q-2	1	0.900			<1.00
	Q-5	1	0.900			12,700
	Q-18	1	0.900			5,600
Manganese	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			6.00
	Q-18	1	<0.050			<50.0

Table V-34 (Continued)

MAGNESIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Molybdenum	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<50.0
Phenolics	Q-2	1	<0.005			<0.005
	Q-5	1	<0.005			<0.01
	Q-18	1	<0.005			<0.01
Phosphate	Q-2	1	<0.5			2,100
	Q-5	1	<0.5			16
	Q-18	1	<0.5			410
Sodium	Q-2	1	74.6			35,700
	Q-5	1	74.6			11,600
	Q-18	1	74.6			10,800
Sulfate	Q-2	1	480			12,000
	Q-5	1	480			210
	Q-18	1	480			9,800
Tin	Q-2	1	<0.050			<50.0
	Q-5	1	<0.050			<50.0
	Q-18	1	<0.050			<5.00
Titanium	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<30.0
Total Dissolved Solids (TDS)	Q-2	1	260			110,000
	Q-5	1	260			150,000
	Q-18	1	260			95,000
Vanadium	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<50.0
Yttrium	Q-2	1	<0.050			<0.500
	Q-5	1	<0.050			<0.500
	Q-18	1	<0.050			<50.0

Table V-34 (Continued)

MAGNESIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	Q-2	1	<1			39
	Q-5	1	<1			>100,000
	Q-18	1	<1			<1
Total Suspended Solids (TSS)	Q-2	1	31			140
	Q-5	1	31			270
	Q-18	1	31			70
pH (standard units)	Q-2	1	7.90			12.60
	Q-5	1	7.90			3.80
	Q-18	1	7.90			0.80

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-35

MAGNESIUM SURFACE TREATMENT RINSE

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	3,340	800	0	3,340	800
	3,340	800	0	3,340	800
2	NR	NR	P	1,510	363
	14,700	3,530	*	12,600+	3,030+
3	30,700	7,360	0	30,700	7,360
	30,900	7,420	0	30,900	7,420
	49,600	11,900	*	49,600	11,900

P - Periodic discharge

* - This water use represents the sum of flows from non-cascaded sequential rinsing stages

NR - Data not reported

+ - Loss due to evaporation and drag-out

Table V-36

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	Q-6	1	0.018		0.004	
	Q-7	1	0.018		0.006	
	Q-11	1	0.018	ND		0.008
22. p-chloro-m-cresol	Q-6	2	0.011		ND	
	Q-7	4	0.011		ND	
	Q-11	3	0.011	ND		ND
44. methylene chloride	Q-6	1	0.002		0.007	
	Q-7	1	0.002		0.007	
	Q-11	1	0.002	0.004		0.013
57. 2-nitrophenol	Q-6	2	ND		0.001	
	Q-7	4	ND		ND	
	Q-11	3	ND	ND		ND
65. phenol	Q-6	2	ND		ND	
	Q-7	4	ND		ND	
	Q-11	3	ND	0.001		ND
114. antimony	Q-3	2	<0.010		<0.010	<0.010
	Q-4	4	<0.010		<0.010	
	Q-6	2	<0.010		<0.010	<0.010
	Q-7	4	<0.010		<0.010	
	Q-8	2	<0.010		<0.010	<0.010
	Q-9	4	<0.010		<0.010	
	Q-10	1	<0.010		<0.010	
	Q-11	3	<0.010	<0.010		<0.010
115. arsenic	Q-3	2	<0.010		<0.010	<0.010
	Q-4	4	<0.010		<0.010	
	Q-6	2	<0.010		<0.010	<0.010
	Q-7	4	<0.010		<0.010	
	Q-8	2	<0.010		<0.010	<0.010
	Q-9	4	<0.010		<0.010	
	Q-10	1	<0.010		<0.010	
	Q-11	3	<0.010	<0.010		<0.010

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
117. beryllium	Q-3	2	<0.005		<0.005	<0.005
	Q-4	4	<0.005		<0.005	
	Q-6	2	<0.005		0.005	0.015
	Q-7	4	<0.005		<0.005	
	Q-8	2	<0.005		<0.050	<0.050
	Q-9	4	<0.005		<0.005	
	Q-10	1	<0.005		<0.005	
	Q-11	3	<0.005	<0.005		<0.005
	AC-2		<0.001	0.001		
118. cadmium	Q-3	2	<0.020		<0.020	<0.020
	Q-4	4	<0.020		<0.020	
	Q-6	2	<0.020		<0.020	<0.020
	Q-7	4	<0.020		<0.020	
	Q-8	2	<0.020		<0.200	<0.200
	Q-9	4	<0.020		<0.020	
	Q-10	1	<0.020		<0.020	
	Q-11	3	<0.020	<0.020		<0.020
	AC-2		<0.005	<0.005		
119. chromium (total)	Q-3	2	<0.020		<0.020	<0.020
	Q-4	4	<0.020		0.040	
	Q-6	2	<0.020		0.040	0.060
	Q-7	4	<0.020		<0.020	
	Q-8	2	<0.020		516	496
	Q-9	4	<0.020		1.14	
	Q-10	1	<0.020		2.24	
	Q-11	3	<0.020	0.020		0.020
	AC-2		0.005	29.900		
120. copper	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		0.0055	0.040		

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
121. cyanide	Q-3	1	<0.02		<0.02	<0.02
	Q-4	1	<0.02		<0.02	
	Q-6	1	<0.02		<0.02	<0.02
	Q-7	1	<0.02		<0.02	
	Q-8	1	<0.02		<0.02	<0.02
	Q-9	1	<0.02		<0.02	
	Q-10	1	<0.02		<0.02	
	Q-11	1	<0.02			<0.02
122. lead	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		<0.050	<0.050		
123. mercury	Q-3	2	<0.0002		0.0003	<0.0002
	Q-4	4	<0.0002		<0.0002	
	Q-6	2	<0.0002		<0.0002	<0.0002
	Q-7	4	<0.0002		<0.0002	
	Q-8	2	<0.0002		<0.0002	<0.0002
	Q-9	4	<0.0002		<0.0002	
	Q-10	1	<0.0002		<0.0002	
	Q-11	3	<0.0002	<0.0002		<0.0002
124. nickel	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		<0.012	0.056		

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
125. selenium	Q-3	2	<0.010		<0.010	<0.010
	Q-4	4	<0.010		<0.010	
	Q-6	2	<0.010		<0.010	<0.010
	Q-7	4	<0.010		<0.010	
	Q-8	2	<0.010		<0.010	<0.010
	Q-9	4	<0.010		<0.010	
	Q-10	1	<0.010		<0.010	
	Q-11	3	<0.010	<0.010		<0.010
126. silver	Q-3	2	<0.010		<0.010	<0.010
	Q-4	4	<0.010		<0.010	
	Q-6	2	<0.010		<0.010	<0.010
	Q-7	4	<0.010		<0.010	
	Q-8	2	<0.010		<0.010	<0.010
	Q-9	4	<0.010		<0.010	
	Q-10	1	<0.010		<0.010	
	Q-11	3	<0.010	<0.010		<0.010
127. thallium	Q-3	2	<0.010		<0.010	<0.020
	Q-4	4	<0.010		<0.010	
	Q-6	2	<0.010		<0.010	<0.010
	Q-7	4	<0.010		<0.010	
	Q-8	2	<0.010		<0.010	<0.010
	Q-9	4	<0.010		<0.010	
	Q-10	1	<0.010		<0.020	
	Q-11	3	<0.010	<0.010		<0.010
128. zinc	Q-3	2	0.040		0.040	0.080
	Q-4	4	0.040		0.020	
	Q-6	2	0.040		3.24	8.42
	Q-7	4	0.040		0.120	
	Q-8	2	0.040		1.00	1.00
	Q-9	4	0.040		0.080	
	Q-10	1	0.040		0.020	
	Q-11	3	0.040	0.320		0.420
	AC-2		0.123	1.860		

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	Q-3	2	<1		<1	<1
	Q-4	4	<1		<1	
	Q-6	2	<1		<1	<1
	Q-7	4	<1		<1	
	Q-8	2	<1		<1	<1
	Q-9	4	<1		<1	
	Q-10	1	<1		<1	
	Q-11	3	<1	<1		<1
Alkalinity	Q-3	2	160		230	340
	Q-4	4	160		170	
	Q-6	2	160		1,200	2,800
	Q-7	4	160		210	
	Q-8	2	160		3.0	21
	Q-9	4	160		160	
	Q-10	1	160		210	
	Q-11	3	160	240		330
Aluminum	Q-3	2	<0.100		<0.100	<0.100
	Q-4	4	<0.100		<0.100	
	Q-6	2	<0.100		3.90	10.9
	Q-7	4	<0.100		0.100	
	Q-8	2	<0.100		<1.00	<1.00
	Q-9	4	<0.100		<0.100	
	Q-10	1	<0.100		<0.100	
	Q-11	3	<0.100	0.400		0.700
	AC-2		0.129	2.160		
Ammonia Nitrogen	Q-3	2	0.4		0.3	0.2
	Q-4	4	0.4		0.5	
	Q-6	2	0.4		26	81
	Q-7	4	0.4		0.7	
	Q-8	2	0.4		1.5	1.8
	Q-9	4	0.4		0.1	
	Q-10	1	0.4		0.1	
	Q-11	3	0.4	1.2		0.8

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Barium	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		0.020	0.024		
Boron	Q-3	2	0.300		0.200	0.200
	Q-4	4	0.300		0.100	
	Q-6	2	0.300		0.200	0.200
	Q-7	4	0.300		0.200	
	Q-8	2	0.300		<1.00	<1.00
	Q-9	4	0.300		0.200	
	Q-10	1	0.300		0.200	
	Q-11	3	0.300	0.100		0.100
	AC-2		<0.010	0.023		
Calcium	Q-3	2	3.70		4.70	4.60
	Q-4	4	3.70		5.30	
	Q-6	2	3.70		5.70	6.00
	Q-7	4	3.70		5.00	
	Q-8	2	3.70		6.00	6.00
	Q-9	4	3.70		4.80	
	Q-10	1	3.20		1.30	
	Q-11	3	3.70	5.00		5.00
	AC-2		28.20	30.70		
Chemical Oxygen Demand (COD)	Q-3	2	500		9.3	10
	Q-4	4	500		32	
	Q-6	2	500		8,800	23,000
	Q-7	4	500		48	
	Q-8	2	500		<10	<10
	Q-9	4	500		9.3	
	Q-10	1	500		53	
	Q-11	3	500	180		780

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chloride	Q-3	2	7		<1	7
	Q-4	4	7		<1	
	Q-6	2	7		<1	<1
	Q-7	4	7		<1	
	Q-8	2	7		<1	<1
	Q-9	4	7		<1	
	Q-10	1	7		<1	
	Q-11	3	7	<1		<1
Cobalt	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		<0.004	0.005		
Fluoride	Q-3	2	0.3		0.67	0.66
	Q-4	4	0.3		0.27	
	Q-6	2	0.3		0.64	0.56
	Q-7	4	0.3		0.73	
	Q-8	2	0.3		2.1	0.92
	Q-9	4	0.3		0.72	
	Q-10	1	0.3		1.0	
	Q-11	3	0.3	0.500		1.9
	AC-2		0.99	0.900		
Iron	Q-3	2	<0.050		0.050	0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		0.200	0.300
	Q-7	4	<0.050		0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	0.500		0.100
	AC-2		0.302	5.770		

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Magnesium	Q-3	2	0.900		4.00	2.40
	Q-4	4	0.900		5.30	
	Q-6	2	0.900		431	1,150
	Q-7	4	0.900		10.5	
	Q-8	2	0.900		57.0	56.0
	Q-9	4	0.900		1.80	
	Q-10	1	0.900		3.00	
	Q-11	3	0.900	16.0		42.4
	AC-2		6.880	49.8		
Manganese	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		0.150	0.350
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		0.007	0.093		
Molybdenum	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		<0.020	<0.020		
Phenolics	Q-3	1	<0.005		0.29	<0.01
	Q-4	1	<0.005		<0.005	
	Q-6	1	<0.005		<0.005	<0.01
	Q-7	1	<0.005		<0.005	
	Q-8	1	<0.005		<0.005	0.010
	Q-9	1	<0.005		<0.005	
	Q-10	1	<0.005		<0.005	
	Q-11	1	<0.005			<0.01

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phosphate	Q-3	2	<0.5		<0.5	5
	Q-4	4	<0.5		<0.5	
	Q-6	2	<0.5		4.8	4.5
	Q-7	4	<0.5		<0.5	
	Q-8	2	<0.5		8.0	10
	Q-9	4	<0.5		<0.5	
	Q-10	1	<0.5		<0.5	
	Q-11	3	<0.5	<0.5		<0.5
Sodium	Q-3	2	74.6		95.0	145
	Q-4	4	74.6		62.9	
	Q-6	2	74.6		143	284
	Q-7	4	74.6		79.8	
	Q-8	2	74.6		119	119
	Q-9	4	74.6		67.8	
	Q-10	1	74.6		101	
	Q-11	3	74.6	79.7		81.7
	AC-2		9.65	22.9		
Sulfate	Q-3	2	480		4,500	1,300
	Q-4	4	480		2,800	
	Q-6	2	480		2,100	7,500
	Q-7	4	480		4,000	
	Q-8	2	480		1,800	3,000
	Q-9	4	480		2,700	
	Q-10	1	480		1,500	
	Q-11	3	480	1,900		1,800
Tin	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.500
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		0.013	<0.013		

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		0.017	0.022		
Total Dissolved Solids (TDS)	Q-3	2	260		290	610
	Q-4	4	260		230	
	Q-6	2	260		3,100	8,000
	Q-7	4	260		330	
	Q-8	2	260		1,700	710
	Q-9	4	260		270	
	Q-10	1	260		5	
	Q-11	3	260	380		580
Total Organic Carbon (TOC)	Q-3	2	4.2		<1	<1
	Q-4	4	4.2		<1	
	Q-6	2	4.2		850	2,500
	Q-7	4	4.2		18	
	Q-8	2	4.2		2	8
	Q-9	4	4.2		<1	
	Q-10	1	4.2		<1	
	Q-11	3	4.2	4.2		69
Total Solids (TS)	Q-3	2	200		240	650
	Q-4	4	200		110	
	Q-6	2	200		3,100	8,700
	Q-7	4	200		240	
	Q-8	2	200		1,600	1,900
	Q-9	4	200		10,000	
	Q-10	1	200		460	
	Q-11	3	200	330		760

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		<0.002	<0.002		
Yttrium	Q-3	2	<0.050		<0.050	<0.050
	Q-4	4	<0.050		<0.050	
	Q-6	2	<0.050		<0.050	<0.050
	Q-7	4	<0.050		<0.050	
	Q-8	2	<0.050		<0.500	<0.500
	Q-9	4	<0.050		<0.050	
	Q-10	1	<0.050		<0.050	
	Q-11	3	<0.050	<0.050		<0.050
	AC-2		<0.010	<2.010		
Conventional Pollutants						
Oil and Grease	Q-3	1	<1		12	7
	Q-4	1	<1		14	
	Q-6	1	<1		<1	3
	Q-7	1	<1		<1	
	Q-8	1	<1		26	15
	Q-9	1	<1		14	
	Q-10	1	<1		8	
	Q-11	1	<1			5
Total Suspended Solids (TSS)	Q-3	2	31		31	5
	Q-4	4	31		27	
	Q-6	2	31		56	12
	Q-7	4	31		31	
	Q-8	2	31		110	130
	Q-9	4	31		10	
	Q-10	1	31		210	
	Q-11	3	31	50		12

Table V-36 (Continued)

MAGNESIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)						
pH (standard units)	Q-3	2	7.90		9.60	10.50
	Q-4	4	7.90		8.80	
	Q-6	2	7.90		7.80	6.00
	Q-7	4	7.90		7.70	
	Q-8	2	7.90		4.60	5.00
	Q-9	4	7.90		7.60	
	Q-10	1	7.90		9.20	
	Q-11	3	7.90	6.80		7.30

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-21, 23-43, 45-56, 58-64, and 66-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-37

MAGNESIUM SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	169	40.5	100 (+)	0	0
2	NR	NR	P	19.5 (CH)	4.68 (CH)

NR - Data not reported
+ - Loss due to evaporation and drag-out
CH - Contract hauled
P - Periodic discharge

Table V-38

MAGNESIUM WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	>90	235	56.4
	NR	NR	>90	621	149
2	10,000	2,400	0	10,000	2,400
	NR	NR	90	NR	NR

NR -- Data not reported

Table V-39

MAGNESIUM WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AC-1		<0.001	0.008		
118. cadmium	AC-1		<0.005	0.022		
119. chromium (total)	AC-1		0.005	0.114		
120. copper	AC-1		0.0055	0.093		
122. lead	AC-1		<0.050	0.877		
124. nickel	AC-1		<0.012	0.081		
128. zinc	AC-1		0.123	0.099		
Nonconventional Pollutants						
Aluminum	AC-1		0.129	1.110		
Ammonia	AC-1		0.020	3.800		
Barium	AC-1		0.020	0.047		
Boron	AC-1		<0.010	0.124		
Calcium	AC-1		28.200	30.500		
Cobalt	AC-1		<0.004	0.086		
Floride	AC-1		0.99	3.400		
Iron	AC-1		0.302	0.350		
Magnesium	AC-1		6.880	7.510		
Manganese	AC-1		0.0067	0.019		
Molybdenum	AC-1		<0.020	0.088		
Tin	AC-1		0.013	0.150		

Table V-39 (Continued)

MAGNESIUM WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	AC-1		0.017	0.091		
Vanadium	AC-1		<0.002	0.088		
Yttrium	AC-1		<0.010	0.036		

No analyses were performed on the following toxic pollutants:
1-116, 121, 123 and 125-127.

Table V-40

NICKEL-COBALT ROLLING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	92.2	22.1	100	0.00	0.00
2	NR	NR	100	0.00	0.00
4	85.1	20.4	100	0.00	0.00
4	NR	NR	100	0.00	0.00
3	NR	NR	P	NR	NR
5	NR	NR	NR	NR	NR
Average	88.7	21.3		0.00	0.00

P - Periodic discharge
NR - Data not reported

Table V-41

NICKEL-COBALT ROLLING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
2	23.17	5.56	0.0	23.17	5.56
3	59,730	14,320	P	62.52	14.99
3	100,100	24,000	P	425.5	102.0
1	NR	NR	P	NR	NR
1	NR	NR	P	NR	NR
4	NR	NR	NR	NR	NR
5	NR	NR	NR	NR	NR
Average	53,280	12,780		170.4	40.85

P - Periodic discharge
NR - Data not reported

Table V-42

NICKEL-COBALT ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	D-4	1	0.009	2.860		
	F-5	1	0.014	ND	ND	ND
23. chloroform	D-4	1	0.144	ND		
	F-5	1	ND	ND	ND	ND
44. methylene chloride	D-4	1	0.002	ND		
	F-5	1	0.002	1.510	1.670	0.810
55. naphthalene	D-4	1	ND	ND		
	F-5	3	0.001	ND	0.977	0.649
64. pentachlorophenol	D-4	1	ND	ND		
	F-5	3	ND	2.470	2.570	1.530
65. phenol	D-4	1	ND	0.607		
	F-5	3	ND	0.468	0.351	0.339
66. bis(2-ethylhexyl) phthalate	D-4	1	0.009	ND		
	F-5	3	ND	ND	ND	ND
81. phenanthrene	D-4	1	ND	ND		
	F-5	3	ND	0.885	ND	ND
114. antimony	D-4	1	<0.003	<0.003		
	F-5	3	<0.002	0.008	0.003	<0.002
115. arsenic	D-4	1	<0.003	<0.003		
	F-5	3	<0.005	0.027	0.007	0.017
117. beryllium	D-4	1	<0.0005	<0.005		
	F-5	3	<0.010	<0.010	<0.010	<0.010
118. cadmium	D-4	1	<0.002	0.079		
	F-5	3	<0.050	<0.050	<0.050	<0.050
119. chromium (total)	D-4	1	0.042	1.1		
	F-5	3	<0.100	3.80	2.81	5.20
120. copper	D-4	1	0.068	1.7		
	F-5	3	0.170	3.11	2.70	4.20
121. cyanide (total)	F-5	1	<0.02	<0.02	<0.02	<0.02

Table V-42 (Continued)

NICKEL-COBALT ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
122. lead	D-4	1	<0.084	0.75		
	F-5	3	<0.100	3.44	3.05	5.28
123. mercury	D-4	1	<0.0002	<0.0002		
	F-5	3	<0.0020	<0.0020	<0.0020	<0.0020
124. nickel	D-4	1	<0.003	4.7		
	F-5	3	0.200	28.0	20.6	34.2
125. selenium	D-4	1	<0.003	<0.003		
	F-5	3	<0.010	<0.010	<0.010	<0.010
126. silver	D-4	1	<0.001	<0.001		
	F-5	3	<0.002	<0.002	0.011	0.014
127. thallium	D-4	1	<0.003	<0.003		
	F-5	3	<0.005	<0.005	<0.005	<0.005
128. zinc	D-4	1	0.038	5.1		
	F-5	3	<0.050	5.58	4.82	6.70
Nonconventional Pollutants						
Acidity	D-4	1	<1	<1		
	F-5	3	<1	<1	<1	<1
Alkalinity	D-4	1	180	420		
	F-5	3	61	260	250	190
Aluminum	D-4	1	<0.050	0.51		
	F-5	3	0.910	1.13	1.12	2.34
Ammonia Nitrogen	D-4	1	<1	<1		
	F-5	3	0.04	6.0	2.6	<0.1
Barium	D-4	1	0.12	0.24		
	F-5	3	0.080	0.110	0.150	0.260
Boron	D-4	1	<0.009	0.28		
	F-5	3	<0.100	<0.100	0.230	0.750
Calcium	D-4	1	63	38		
	F-5	3	46.2	11.3	10.9	18.5

Table V-42 (Continued)

NICKEL-COBALT ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	D-4	1	<5	21,100		
	F-5	3	<1	86,000	76,000	26,000
Chloride	D-4	1	34	340		
	F-5	3	12	35	34	38
Cobalt	D-4	1	<0.006	0.41		
	F-5	3	<0.100	<0.100	<0.100	<0.100
Fluoride	D-4	1	0.45	10.2		
	F-5	3	0.43	3.9	2.2	1.9
Iron	D-4	1	0.066	18		
	F-5	3	1.37	74.4	58.0	88.0
Magnesium	D-4	1	24	66		
	F-5	3	12.7	5.33	5.05	9.52
Manganese	D-4	1	0.012	3.1		
	F-5	3	0.080	0.580	0.490	0.720
Molybdenum	D-4	1	0.030	1.1		
	F-5	3	<0.200	<0.200	0.400	1.07
Phenolics	F-5	1	<0.005	0.99	1.13	0.12
Phosphate	D-4	1	<4	30		
	F-5	3	<4	150	250	230
Sodium	D-4	1	9.5	28		
	F-5	3	154	14.5	12.0	20.2
Sulfate	D-4	1	53	380		
	F-5	3	130	550	220	330
Tin	D-4	1	<0.12	<0.12		
	F-5	3	<0.200	<0.200	<0.200	<0.200
Titanium	D-4	1	<0.005	0.85		
	F-5	3	<0.020	0.150	0.080	0.170

Table V-42 (Continued)

NICKEL-COBALT ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Dissolved Solids (TDS)	D-4	1	393	6,000		
	F-5	3	320	4,400	5,300	5,900
Total Organic Carbon (TOC)	D-4	1	8	10,300		
	F-5	3	2	15,000	11,000	13,000
Total Solids (TS)	D-4	1	395	22,000		
	F-5	3	330	30,000	60,000	30,000
Vanadium	D-4	1	0.016	0.038		
	F-5	3	<0.010	<0.010	<0.010	<0.010
Yttrium	D-4	1	<0.002	<0.002		
	F-5	3	<0.020	<0.020	<0.020	<0.020
Conventional Pollutants						
Oil and Grease	D-4	1	<1	800		
	F-5	1	<1	1,220	2,600	7,600
Total Suspended Solids (TSS)	D-4	1	<1	960		
	F-5	3	22	6,800	5,500	6,220
pH (standard units)	D-4	1	7.14	6.17		
	F-5	3	6.64	5.63	6.08	6.25

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-22, 24-43, 45-54, 56-63, 67-80, and 82-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-43

NICKEL-COBALT ROLLING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
1	NR	NR	100	0.00	0.00
2	72.76	17.45	0.0	72.76	17.45
3	434.6	104.2	0.0	434.6	104.2
4	43,370	10,400	98.8	536.8	128.7
5	3,470	832.2	0.0	3,470	832.2
2	4,074	976.9	0.0	4,074	976.9
4	4,583	1,099	0.0	4,583	1,099
6	NR	NR	P	NR	NR
Average	9,334	2,238		2,195	526.4

P - Periodic discharge
NR - Data not reported

Table V-44

NICKEL-COBALT ROLLING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	D-2	1	0.009		0.008	
	D-3	1	0.009	0.016		
	F-3	1	0.014	0.135	0.246	0.087
	F-4	1	0.014	0.015	ND	ND
13. 1,1-dichloroethane	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	1	ND	0.006	0.023	ND
	F-4	1	ND	ND	ND	ND
22. p-chloro-m-cresol	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	3	ND	ND	0.046	ND
	F-4	3	ND	ND	ND	ND
23. chloroform	D-2	1	0.144		ND	
	D-3	1	0.144	ND		
	F-3	1	ND	ND	ND	ND
	F-4	1	ND	ND	ND	ND
29. 1,1-dichloroethylene	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	1	ND	0.005	0.013	ND
	F-4	1	ND	ND	ND	ND
34. 2,4-dimethylphenol	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	3	ND	ND	0.038	ND
	F-4	3	ND	ND	ND	ND
44. methylene chloride	D-2	1	0.002		ND	
	D-3	1	0.002	0.002		
	F-3	1	0.002	0.005	0.002	0.017
	F-4	1	0.002	0.003	0.171	0.015
55. naphthalene	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	3	0.001	ND	ND	ND
	F-4	3	0.001	ND	0.123	0.007
65. phenol	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	3	ND	0.039	ND	0.012
	F-4	3	ND	0.220	0.379	0.054

Table V-44 (Continued)

NICKEL-COBALT ROLLING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
66. bis(2-ethylhexyl) phthalate	D-2	1	0.009		ND	
	D-3	1	0.009	0.016		
	F-3	3	ND	ND	ND	0.002
	F-4	3	ND	ND	ND	0.003
67. butyl benzyl phthalate	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	3	ND	ND	ND	ND
	F-4	3	ND	ND	ND	0.002
68. di-n-butyl phthalate	D-2	1	ND		ND	
	D-3	1	ND	ND		
	F-3	3	ND	ND	ND	0.001
	F-4	3	ND	ND	ND	ND
114. antimony	D-2	1	<0.003		<0.003	
	D-3	1	<0.003	<0.003		
	F-3	3	<0.002	0.002	<0.002	<0.002
	F-4	3	<0.002	<0.002	<0.002	<0.002
115. arsenic	D-2	1	<0.003		<0.003	
	D-3	1	<0.003	<0.003		
	F-3	3	<0.005	<0.005	<0.005	<0.005
	F-4	3	<0.005	0.018	<0.005	<0.005
117. beryllium	D-2	1	<0.0005		<0.005	
	D-3	1	<0.0005	0.001		
	F-3	3	<0.010	<0.010	<0.010	<0.010
	F-4	3	<0.010	<0.010	<0.010	<0.010
118. cadmium	D-2	1	<0.002		0.084	
	D-3	1	<0.002	0.13		
	F-3	3	<0.050	<0.050	<0.050	<0.050
	F-4	3	<0.050	<0.050	<0.050	<0.050
119. chromium (total)	D-2	1	0.042		1.8	
	D-3	1	0.042	0.52		
	F-3	3	<0.100	<0.100	<0.100	<0.100
	F-4	3	<0.100	<0.100	<0.100	<0.100
120. copper	D-2	1	0.068		0.083	
	D-3	1	0.068	0.78		
	F-3	3	0.170	0.350	0.260	0.140
	F-4	3	0.170	0.240	0.320	0.160

Table V-44 (Continued)

NICKEL-COBALT ROLLING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
121. cyanide (total)	F-3	1	<0.02	<0.02	<0.02	<0.02
	F-4	1	<0.02	<0.02	<0.02	<0.02
122. lead	D-2	1	<0.084		<0.084	
	D-3	1	<0.084	0.15		
	F-3	3	<0.100	<0.100	<0.100	<0.100
	F-4	3	<0.100	<0.100	<0.100	<0.100
123. mercury	D-2	1	<0.0002		<0.0002	
	D-3	1	<0.0002	<0.0002		
	F-3	3	<0.0020	<0.0020	<0.0020	<0.0020
	F-4	3	<0.0020	<0.0020	<0.0020	<0.0020
124. nickel	D-2	1	<0.003		6.5	
	D-3	1	<0.003	9.4		
	F-3	3	0.200	0.560	0.600	0.180
	F-4	3	0.200	1.42	0.600	0.580
125. selenium	D-2	1	<0.003		<0.003	
	D-3	1	<0.003	<0.003		
	F-3	3	<0.010	<0.010	<0.010	<0.010
	F-4	3	<0.010	<0.010	<0.010	<0.010
126. silver	D-2	1	<0.001		<0.001	
	D-3	1	<0.001	<0.001		
	F-3	3	<0.002	<0.002	<0.002	<0.002
	F-4	3	<0.002	<0.002	<0.002	<0.002
127. thallium	D-2	1	<0.003		<0.003	
	D-3	1	<0.003	<0.003		
	F-3	3	<0.005	<0.005	<0.005	<0.005
	F-4	3	<0.005	<0.005	<0.005	<0.005
128. zinc	D-2	1	0.038		0.28	
	D-3	1	0.038	0.51		
	F-3	3	<0.050	0.060	0.050	0.050
	F-4	3	<0.050	0.070	0.110	0.070

Table V-44 (Continued)

NICKEL-COBALT ROLLING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	D-2	1	<1		<1	
	D-3	1	<1	<1		
	F-3	3	<1	<1	<1	<1
	F-4	3	<1	<1	<1	<1
Alkalinity	D-2	1	180		110	
	D-3	1	180	110		
	F-3	3	61	62	63	46
	F-4	3	61	42	48	46
Aluminum	D-2	1	<0.050		0.45	
	D-3	1	<0.050	1.1		
	F-3	3	0.910	0.290	0.720	0.390
	F-4	3	0.910	0.100	0.420	0.220
Ammonia Nitrogen	D-2	1	<1		0.17	
	D-3	1	<1	<1		
	F-3	3	0.04	0.30	0.34	<0.01
	F-4	3	0.04	0.23	0.18	0.09
Barium	D-2	1	0.12		0.15	
	D-3	1	0.12	0.0035		
	F-3	3	0.080	0.060	0.080	0.050
	F-4	3	0.080	0.040	0.060	0.040
Boron	D-2	1	<0.009		0.059	
	D-3	1	<0.009	0.24		
	F-3	3	<0.100	<0.100	0.390	0.130
	F-4	3	<0.100	<0.100	0.260	0.230
Calcium	D-2	1	63		110	
	D-3	1	63	47		
	F-3	3	46.2	32.5	36.7	30.2
	F-4	3	46.2	30.8	33.0	29.7
Chemical Oxygen Demand (COD)	D-2	1	<5		61	
	D-3	1	<5	540		
	F-3	3	<1	310	190	33
	F-4	3	<1	210	350	220

Table V-44 (Continued)

NICKEL-COBALT ROLLING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chloride	D-2	1	34		64	
	D-3	1	34	81		
	F-3	3	12	27	28	31
	F-4	3	12	28	34	1,210
Cobalt	D-2	1	<0.006		0.68	
	D-3	1	<0.006	0.29		
	F-3	3	<0.100	<0.100	<0.100	<0.100
	F-4	3	<0.100	<0.100	<0.100	<0.100
Fluoride	D-2	1	0.45		2.1	
	D-3	1	0.45	1.4		
	F-3	3	0.43	1.1	4.4	1.2
	F-4	3	0.43	1.1	1.7	1.2
Iron	D-2	1	0.066		3.1	
	D-3	1	0.066	3.8		
	F-3	3	1.37	0.990	0.820	1.43
	F-4	3	1.37	0.580	0.610	0.290
Magnesium	D-2	1	24		35	
	D-3	1	24	32		
	F-3	3	12.7	10.8	11.8	10.2
	F-4	3	12.7	10.6	10.8	10.1
Manganese	D-2	1	0.012		0.10	
	D-3	1	0.012	0.31		
	F-3	3	0.080	0.080	0.160	0.050
	F-4	3	0.080	0.120	0.070	0.070
Molybdenum	D-2	1	0.030		1.8	
	D-3	1	0.030	18		
	F-3	3	<0.200	<0.200	<0.200	<0.200
	F-4	3	<0.200	<0.200	<0.200	0.380
Phenolics	F-3	1	<0.005	0.095	0.36	0.017
	F-4	1	<0.005	0.29	<0.005	6.0
Phosphate	D-2	1	<4		<4	
	D-3	1	<4	100		
	F-3	3	<4	13	<4	<4
	F-4	3	<4	12	<4	<4

Table V-44 (Continued)

NICKEL-COBALT ROLLING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sodium	D-2	1	9.5		26	
	D-3	1	9.5	23		
	F-3	3	154	26.8	13.9	13.4
	F-4	3	154	26.8	27.8	27.4
Sulfate	D-2	1	53		240	
	D-3	1	53	93		
	F-3	3	130	160	100	97
	F-4	3	130	150	98	110
Tin	D-2	1	<0.12		<0.12	
	D-3	1	<0.12	1.1		
	F-3	3	<0.200	<0.200	<0.200	<0.200
	F-4	3	<0.200	<0.200	<0.200	<0.200
Titanium	D-2	1	<0.005		1.1	
	D-3	1	<0.005	0.15		
	F-3	3	<0.020	<0.020	0.020	<0.020
	F-4	3	<0.020	<0.020	<0.020	<0.020
Total Dissolved Solids (TDS)	D-2	1	393		560	
	D-3	1	393	580		
	F-3	5	320	260	380	270
	F-4	3	320	280	290	270
Total Organic Carbon (TOC)	D-2	1	8		79	
	D-3	1	8	200		
	F-3	3	2	45	38	4
	F-4	3	2	31	120	60
Total Solids (TS)	D-2	1	395		620	
	D-3	1	395	1,070		
	F-3	3	330	360	400	360
	F-4	3	330	370	380	360
Vanadium	D-2	1	0.016		0.050	
	D-3	1	0.016	0.057		
	F-3	3	<0.010	<0.010	<0.010	<0.010
	F-4	3	<0.010	<0.010	<0.010	<0.010
Yttrium	D-2	1	<0.002		<0.002	
	D-3	1	<0.002	<0.002		
	F-3	3	<0.020	<0.020	<0.020	<0.020
	F-4	3	<0.020	<0.020	<0.020	<0.020

Table V-44 (Continued)

NICKEL-COBALT ROLLING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	D-2	1	<1		38	
	D-3	1	<1	300		
	F-3	1	<1	115	99	37
	F-4	1	<1	190	84	60
Total Suspended Solids (TSS)	D-2	1	<1		74	
	D-3	1	<1	350		
	F-3	3	22	35	25	30
	F-4	3	22	50	90	42
pH (standard units)	D-2	1	7.14		6.41	
	D-3	1	7.14	6.22		
	F-3	3	6.64	7.73	6.14	6.37
	F-4	3	6.64	6.29	5.84	6.14

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12, 14-21, 24-28, 30-33, 35-43, 45-54, 56-64, and 69-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-45

NICKEL-COBALT TUBE REDUCING SPENT LUBRICANTS

Plant	Water Use** L/kkg	Water Use** gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1*	16.04	3.85	P	16.04	3.85
2	292.0	70.00	P	292.0	70.00
3	NR	NR	NR	NR	NR
Average	154.0	36.93		154.0	36.93

P - Periodic discharge
NR - Data not reported

*Nickel forming no longer performed at this plant.

**Waste lubricant per mass of nickel tube reduced.

Table V-46

NICKEL-COBALT TUBE REDUCING SPENT LUBRICANTS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	F-18	1	0.014			33
44. methylene chloride	F-18	1	0.002			4.75
55. naphthalene	F-18	1	0.001			ND
62. N-nitrosodiphenylamine	F-18	1	ND			28.2
114. antimony	F-18	1	<0.002			<0.002
115. arsenic	F-18	1	<0.005			0.017
117. beryllium	F-18	1	<0.010			<0.010
118. cadmium	F-18	1	<0.050			<0.050
119. chromium (total)	F-18	1	<0.100			0.680
120. copper	F-18	1	0.170			43.5
121. cyanide (total)	F-18	1	<0.2			<0.2
122. lead	F-18	1	<0.100			47.6
123. mercury	F-18	1	<0.0020			<0.0020
124. nickel	F-18	1	0.200			58.0
125. selenium	F-18	1	<0.010			<0.010
126. silver	F-18	1	<0.002			0.002
127. thallium	F-18	1	<0.005			<0.005
128. zinc	F-18	1	<0.050			63.1
Nonconventional Pollutants						
Aluminum	F-18	1	0.910			23.4
Ammonia Nitrogen	F-18	1	0.04			<0.01
Barium	F-18	1	0.080			1.98

Table V-46 (Continued)

NICKEL-COBALT TUBE REDUCING SPENT LUBRICANTS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	F-18	1	<0.100			17.2
Calcium	F-18	1	46.2			7,010
Cobalt	F-18	1	<0.100			<0.100
Iron	F-18	1	1.37			21.4
Magnesium	F-18	1	12.7			379
Manganese	F-18	1	0.080			4.01
Molybdenum	F-18	1	<0.200			0.620
Phenolics	F-18	1	<0.005			<0.005
Phosphate	F-18	1	<4			<4
Sodium	F-18	1	154			1,260
Sulfate	F-18	1	130			340
Tin	F-18	1	<0.200			<0.200
Titanium	F-18	1	<0.020			<0.020
Total Dissolved Solids (TDS)	F-18	1	320			360,000
Total Solids (TS)	F-18	1	330			370,000
Vanadium	F-18	1	<0.010			<0.010
Yttrium	F-18	1	<0.020			<0.020
Conventional Pollutants						
Oil and Grease	F-18	1	<1			200,000
Total Suspended Solids (TSS)	F-18	1	22			<1
pH (standard units)	F-18	1	6.64			6.10

Table V-46 (Continued)

NICKEL-COBALT TUBE REDUCING SPENT LUBRICANTS
RAW WASTEWATER SAMPLING DATA

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-43, 45-54, 56-61, and 63-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-47

NICKEL-COBALT DRAWING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
4	36.0	8.64	100	0.00	0.00
4	158	38.0	100	0.00	0.00
5*	1.16	0.28	0.0	1.16	0.28
5*	2.32	0.56	0.0	2.32	0.56
5*	2.32	0.56	0.0	2.32	0.56
2	NR	NR	P	NR	NR
3	20.6	4.95	P	NR	NR
6	NR	NR	NR	NR	NR
7	NR	NR	NR	NR	NR
8	NR	NR	NR	NR	NR
Average	36.73	8.83		1.93	0.46

P - Periodic discharge
NR - Data not reported

*Nickel forming no longer performed at this plant.

Table V-48

NICKEL-COBALT DRAWING SPENT EMULSIONS

Plant	Water Use* L/kkg	Water Use* gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	NR	NR
2	NR	NR	P	NR	NR
3	NR	NR	P	NR	NR
4	NR	NR	P	NR	NR
5	NR	NR	P	NR	NR
6	NR	NR	P	NR	NR
7	135	32.3	P	135	32.3
7	135	32.3	P	135	32.3
8	16.9	4.05	P	16.9	4.05
Average	95.4	22.9		95.4	22.9

P - Periodic discharge
NR - Data not reported

*Waste emulsion per mass of nickel drawn.

Table V-49

NICKEL-COBALT DRAWING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AS-1	1	-	<0.02		
118. cadmium	AS-1	1	-	<0.05		
119. chromium (total)	AS-1	1	-	<0.05		
120. copper	AS-1	1	-	50.0		
122. lead	AS-1	1	-	<0.05		
124. nickel	AS-1	1	-	3.0		
128. zinc	AS-1	1	-	2.6		
Nonconventional Pollutants						
Cobalt	AS-1	1	-	<0.05		
Fluoride	AS-1	1	-	<6.		
Iron	AS-1	1	-	17.0		

Table V-49 (Continued)

NICKEL-COBALT DRAWING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Molybdenum	AS-1	1	-	<0.03		
Titanium	AS-1	1	-	<0.06		
Conventional Pollutants						
Oil and Grease	AS-1	1	-	2,490.0		
Total Suspended Solids (TSS)	AS-1		-	1,300.0		

1. No analyses were performed on the following toxic pollutants: 1-116, 121, 123 and 125-127.

Table V-50

NICKEL-COBALT EXTRUSION SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	100	0.00	0.00
3	NR	NR	100	0.00	0.00
4	127	30.5	100	0.00	0.00
Average	127	30.5		0.00	0.00

NR - Data not reported

Table V-51

NICKEL-COBALT EXTRUSION PRESS AND SOLUTION HEAT TREATMENT
CONTACT COOLING WATER

Plant	Water Use* L/kkg	Water Use* gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	46.3	11.1	0.0	46.3	11.1
2	120	28.9	P	120	28.9
Average	83.2	20.0		83.2	20.0

P - Periodic discharge

*Wastewater generated per mass of nickel-cobalt.

Table V-52

NICKEL-COBALT EXTRUSION PRESS AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
5. benzidine	E-3	1	0.762		**	
11. 1,1,1-trichloroethane	E-3	1	0.005		ND	
23. chloroform	E-3	1	0.015		ND	
28. 3,3'-dichlorobenzidine	E-3	1	0.001		ND	
36. 2,6-dinitrotoluene	E-3	1	0.002		0.002	
37. 1,2-diphenylhydrazine	E-3	1	0.001		ND	
43. bis(2-choroethoxy)methane	E-3	1	0.001		ND	
55. naphthalene	E-3	1	0.001		ND	
61. N-nitrosodimethylamine	E-3	1	0.001		**	
63. N-nitrosodi-n-propylamine	E-3	1	0.024		0.022	
66. bis(2-ethylhexyl) phthalate	E-3	1	0.001		0.001	
67. butyl benzyl phthalate	E-3	1	0.001		ND	
69. di-n-octyl phthalate	E-3	1	ND		0.004	
70. diethyl phthalate	E-3	1	**		ND	
114. antimony	E-3	1	<0.005		<0.005	
115. arsenic	E-3	1	<0.005		<0.005	
117. beryllium	E-3	1	<0.010		<0.010	
118. cadmium	E-3	1	<0.050		<0.050	
119. chromium (total)	E-3	1	<0.100		0.130	
120. copper	E-3	1	0.080		0.050	
121. cyanide (total)	E-3	1	<0.02		<0.02	
122. lead	E-3	1	<0.100		<0.100	

Table V-52 (Continued)

NICKEL-COBALT EXTRUSION PRESS AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	E-3	1	<0.0010		<0.0010	
124. nickel	E-3	1	<0.100		0.140	
125. selenium	E-3	1	<0.010		<0.010	
126. silver	E-3	1	<0.002		<0.002	
127. thallium	E-3	1	<0.002		<0.002	
128. zinc	E-3	1	<0.050		0.070	
Nonconventional Pollutants						
Acidity	E-3	1	<1		<1	
Alkalinity	E-3	1	83		55	
Aluminum	E-3	1	0.300		0.080	
Ammonia Nitrogen	E-3	1	0.22		0.13	
Barium	E-3	1	0.060		0.050	
Boron	E-3	1	0.170		0.600	
Calcium	E-3	1	33.0		24.4	
Chemical Oxygen Demand	E-3	1	34		33	
Chloride	E-3	1	26		15	
Cobalt	E-3	1	<0.100		<0.100	
Fluoride	E-3	1	0.44		0.83	
Iron	E-3	1	1.0		0.4	
Magnesium	E-3	1	15.8		10.2	
Manganese	E-3	1	0.140		0.014	
Molybdenum	E-3	1	<0.200		<0.200	

Table V-52 (Continued)

NICKEL-COBALT EXTRUSION PRESS AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phenolics	E-3	1	0.014		0.021	
Phosphate	E-3	1	16		12	
Sodium	E-3	1	33.0		26.6	
Sulfate	E-3	1	170		150	
Tin	E-3	1	<0.200		<0.200	
Titanium	E-3	1	<0.020		<0.020	
Total Dissolved Solids (TDS)	E-3	1	330		170	
Total Organic Carbon (TOC)	E-3	1	<1		<1	
Total Solids (TS)	E-3	1	380		230	
Vanadium	E-3	1	<0.010		<0.010	
Yttrium	E-3	1	<0.020		<0.020	
Conventional Pollutants						
Oil and Grease	E-3	1	<1		7	
Total Suspended Solids (TSS)	E-3	1	29		3.0	
pH (standard units)	E-3	1	6.71		7.39	

1. The following toxic pollutants were not detected in this waste stream: 1-4, 6-10, 12-22, 24-27, 29-35, 38-42, 44-54, 56-60, 62, 64, 65, 68, and 71-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-53

NICKEL-COBALT EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	231.9	55.60
Average	NR	NR		231.9	55.60

NR - Data not reported

Table V-54

NICKEL-COBALT EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
5. benzidine	E-6	3	0.762	0.010	1.159	0.576
11. 1,1,1-trichloroethane	E-6	1	0.005	0.540	0.720	0.820
12. hexachloroethane	E-6	3	ND	ND	0.006	ND
13. 1,1-dichloroethane	E-6	1	ND	ND	ND	0.005
22. p-chloro-m-cresol	E-6	3	ND	0.680	ND	**
23. chloroform	E-6	1	0.015	ND	ND	ND
28. 3,3'-dichlorobenzidine	E-6	3	0.001	0.810	0.010	0.019
34. 2,4-dimethylphenol	E-6	3	ND	**	**	ND
36. 2,6-dinitrotoluene	E-6	3	0.002	0.001	0.001	0.086
37. 1,2-diphenylhydrazine	E-6	3	0.001	0.001	0.001	0.001
39. fluoranthene	E-6	3	ND	0.001	0.001	0.001
43. bis(2-choroethoxy)methane	E-6	3	0.001	ND	0.001	0.002
44. methylene chloride	E-6	1	ND	0.160	ND	ND
55. naphthalene	E-6	3	0.001	0.002	0.001	0.002
61. N-nitrosodimethylamine	E-6	3	0.001	0.001	0.001	0.001
63. N-nitrosodi-n-propylamine	E-6	3	0.024	0.018	0.021	0.016
65. phenol	E-6	3	ND	**	**	**
66. bis(2-ethylhexyl) phthalate	E-6	3	0.001	**	0.003	**
67. butyl benzyl phthalate	E-6	3	0.001	0.003	0.002	0.005
70. diethyl phthalate	E-6	3	**	ND	0.001	ND
71. dimethyl phthalate	E-6	3	ND	ND	0.004	ND
72. benzo(a)anthracene	E-6	3	ND	ND	ND	**

Table V-54 (Continued)

NICKEL-COBALT EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
73. benzo(a)pyrene	E-6	3	ND	17.40	ND	ND
75. benzo(k)fluoranthane	E-6	3	ND	**	ND	ND
76. chrysene	E-6	3	ND	ND	ND	**
78. anthracene	E-6	3	ND	0.002	ND	0.002
81. phenanthrene	E-6	3	ND	ND	0.001	ND
83. indeno(1,2,3-c,d)pyrene	E-6	3	ND	ND	ND	0.001
84. pyrene	E-6	3	ND	0.001	0.001	0.001
114. antimony	E-6	3	<0.005	<0.005	<0.005	<0.005
115. arsenic	E-6	3	<0.005	<0.005	<0.005	<0.005
117. beryllium	E-6	3	<0.010	<0.010	<0.010	<0.010
118. cadmium	E-6	3	<0.050	<0.050	<0.050	<0.050
119. chromium (total)	E-6	3	<0.100	<0.100	<0.100	<0.100
120. copper	E-6	3	0.080	0.620	0.180	0.750
121. cyanide (total)	E-6	1	<0.02	<0.02	<0.02	<0.02
122. lead	E-6	3	<0.100	0.240	0.220	0.190
123. mercury	E-6	3	<0.0010	<0.0010	<0.0010	<0.0010
124. nickel	E-6	3	<0.100	0.510	<0.100	1.30
125. selenium	E-6	3	<0.010	<0.010	<0.010	<0.010
126. silver	E-6	3	<0.002	<0.002	<0.002	<0.002
127. thallium	E-6	3	<0.002	<0.002	<0.002	<0.002

Table V-54 (Continued)

NICKEL-COBALT EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
128. zinc	E-6	3	<0.050	0.310	0.100	0.240
Nonconventional Pollutants						
Acidity	E-6	3	<1	<1	<1	<1
Alkalinity	E-6	3	83	120	150	150
Aluminum	E-6	3	0.300	0.800	0.200	0.500
Ammonia Nitrogen	E-6	3	0.22	0.19	0.19	0.37
Barium	E-6	3	0.060	0.120	0.080	0.070
Boron	E-6	3	0.170	0.400	0.140	0.460
Calcium	E-6	3	33.0	34.2	32.8	30.4
Chemical Oxygen Demand	E-6	3	34	330	18	890
Chloride	E-6	3	26	24	24	21
Cobalt	E-6	3	<0.100	<0.100	<0.100	<0.100
Fluoride	E-6	3	0.44	0.39	0.69	0.64
Iron	E-6	3	1.0	3.5	1.6	2.4
Magnesium	E-6	3	15.8	14.4	15.0	13.3
Manganese	E-6	3	0.140	0.100	0.080	0.110
Molybdenum	E-6	3	<0.200	<0.200	<0.200	<0.200
Phenolics	E-6	1	0.014	8.5	2.421	9.52
Phosphate	E-6	3	16	21	18	30
Sodium	E-6	3	33	71	75	80

Table V-54 (Continued)

NICKEL-COBALT EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sulfate	E-6	3	170	170	190	190
Tin	E-6	3	<0.200	<0.200	<0.200	<0.200
Titanium	E-6	3	<0.020	<0.020	<0.020	<0.020
Total Dissolved Solids (TDS)	E-6	3	330	470	360	580
Total Organic Carbon (TOC)	E-6	3	<1	68	89	110
Total Solids (TS)	E-6	3	380	590	470	800
Vanadium	E-6	3	<0.010	<0.010	<0.010	<0.010
Yttrium	E-6	3	<0.020	<0.020	<0.020	<0.020
Conventional Pollutants						
Oil and Grease	E-6	1	<1	350	340	420
Total Suspended Solids (TSS)	E-6	3	29	220	33.0	250
pH (standard units)	E-6	3	6.71	6.12	6.56	6.91

**Present, but not quantifiable.

1. Toxic pollutants 89-113 were analyzed in this waste stream.

2. The following toxic pollutants were not detected in this waste stream: 1-4, 6-10, 14-21, 24-27, 29-33, 35, 38, 40-42, 45-54, 56-60, 62, 64, 68, 69, 74, 77, 79, 80, 82, and 85-113.

3. No analyses were performed on the following toxic pollutants: 116 and 129.

Table V-55

NICKEL-COBALT FORGING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	2.10	0.50	100	0.00	0.00
1	6.80	1.63	100	0.00	0.00
5	NR	NR	100	0.00	0.00
3	NR	NR	NR	0.00	0.00
2*	NR	NR	P	2.55	0.61
4	NR	NR	NR	NR	NR
Average	4.45	1.07		2.55	0.61

P - Periodic discharge
NR - Data not reported

*This plant no longer forms nickel.

Table V-56

NICKEL-COBALT FORGING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	1,197	287.0	95.5	53.52	12.83
2	208.2	49.94	0.0	208.2	49.94
3	225.3	54.02	0.0	225.3	54.02
4	417.0	100.0	0.0	417.0	100.0
5	323.4	77.56	0.0	323.4	77.56
6	NR	NR	NR	NR	NR
Average	474.1	113.7		245.5	58.9

NR - Data not reported

Table V-57

NICKEL-COBALT FORGING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	D-6	1	0.009		0.030	
13. 1,1-dichloroethane	D-6	1	ND		0.012	
23. chloroform	D-6	1	0.144		0.022	
44. methylene chloride	D-6	1	ND		0.071	
66. bis(2-ethylhexyl) phthalate	D-6	1	0.009		0.002	
86. toluene	D-6	1	ND		0.005	
114. antimony	D-6	1	<0.003		<0.003	
115. arsenic	D-6	1	<0.003		<0.003	
117. beryllium	D-6	1	<0.0005		0.077	
118. cadmium	D-6	1	<0.002		0.26	
119. chromium (total)	D-6	1	0.042		0.69	
120. copper	D-6	1	0.068		3.4	
122. lead	D-6	1	<0.084		<0.084	
123. mercury	D-6	1	<0.0002		<0.002	
124. nickel	D-6	1	<0.003		16	
125. selenium	D-6	1	<0.003		<0.003	

Table V-57 (Continued)

NICKEL-COBALT FORGING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	D-6	1	<0.001		<0.001	
127. thallium	D-6	1	<0.003		<0.003	
128. zinc	D-6	1	0.038		0.054	
Nonconventional Pollutants						
Acidity	D-6	1	<1		<1	
Alkalinity	D-6	1	180		250	
Aluminum	D-6	1	<0.050		0.93	
Ammonia Nitrogen	D-6	1	<1		0.30	
Barium	D-6	1	0.12		0.066	
Boron	D-6	1	<0.009		0.91	
Calcium	D-6	1	63		66	
Chemical Oxygen Demand	D-6	1	<5		<5	
Chloride	D-6	1	34		37	
Cobalt	D-6	1	<0.006		0.61	
Fluoride	D-6	1	0.45		0.81	
Iron	D-6	1	0.066		4.0	

Table V-57 (Continued)

NICKEL-COBALT FORGING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Magnesium	D-6	1	24		24	
Manganese	D-6	1	0.012		0.24	
Molybdenum	D-6	1	0.030		4.9	
Phosphate	D-6	1	<4		<4	
Sodium	D-6	1	9.5		9.4	
Sulfate	D-6	1	53		37	
Tin	D-6	1	<0.12		<0.12	
Titanium	D-6	1	<0.005		0.62	
Total Dissolved Solids (TDS)	D-6	1	393		310	
Total Organic Carbon (TOC)	D-6	1	8		30	
Total Solids (TS)	D-6	1	395		2,300	
Vanadium	D-6	1	0.016		0.33	
Yttrium	D-6	1	<0.002		0.002	

Table V-57 (Continued)

NICKEL-COBALT FORGING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	D-6	1	<1		<1	
Total Suspended Solids (TSS)	D-6	1	<1		1,800	
pH (standard units)	D-6	1	7.14		7.63	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12, 14-22, 24-43, 45-65, 67-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-58

NICKEL-COBALT FORGING EQUIPMENT CLEANING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	13.9	3.33	0.0	13.9	3.33
1	66.1	15.8	0.0	66.1	15.8
Average	40.0	9.57		40.0	9.57

Table V-59

NICKEL-COBALT FORGING PRESS HYDRAULIC FLUID LEAKAGE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	187.0	44.84
Average	NR	NR		187.0	44.84

NR - Data not reported

Table V-60

NICKEL-COBALT FORGING PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	D-7	1	0.009		2.050	
13. 1,1-dichloroethane	D-7	1	ND		0.374	
23. chloroform	D-7	1	0.144		ND	
44. methylene chloride	D-7	1	0.002		0.012	
66. bis(2-ethylhexyl) phthalate	D-7	1	0.009		0.175	
81. phenanthrene	D-7	1	ND		0.087	
114. antimony	D-7	1	<0.003		<0.003	
115. arsenic	D-7	1	<0.003		<0.003	
117. beryllium	D-7	1	<0.0005		<0.0005	
118. cadmium	D-7	1	0.002		0.012	
119. chromium (total)	D-7	1	0.042		0.19	
120. copper	D-7	1	0.068		1.0	
122. lead	D-7	1	<0.084		0.40	
123. mercury	D-7	1	<0.0002		<0.0002	
124. nickel	D-7	1	<0.003		0.64	
125. selenium	D-7	1	<0.003		<0.003	
126. silver	D-7	1	<0.001		<0.001	
127. thallium	D-7	1	<0.003		<0.003	

Table V-60 (Continued)

NICKEL-COBALT FORGING PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
128. zinc	D-7	1	0.038		0.26	
Nonconventional Pollutants						
Acidity	D-7	1	<1		<1	
Alkalinity	D-7	1	180		220	
Aluminum	D-7	1	<0.050		<0.050	
Ammonia Nitrogen	D-7	1	<1		0.25	
Barium	D-7	1	0.12		0.23	
Boron	D-7	1	<0.009		0.12	
Calcium	D-7	1	63		75	
Chemical Oxygen Demand	D-7	1	<5		4,110	
Chloride	D-7	1	34		47	
Cobalt	D-7	1	<0.006		0.099	
Fluoride	D-7	1	0.45		0.97	
Iron	D-7	1	0.066		2.1	
Magnesium	D-7	1	24		26	
Manganese	D-7	1	0.012		0.083	
Molybdenum	D-7	1	0.030		0.24	
Phosphate	D-7	1	<4		<4	
Sodium	D-7	1	9.5		27	
Sulfate	D-7	1	53		110	

Table V-60 (Continued)

NICKEL-COBALT FORGING PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Tin	D-7	1	<0.12		<0.12	
Titanium	D-7	1	<0.005		0.11	
Total Dissolved Solids (TDS)	D-7	1	393		1,480	
Total Organic Carbon (TOC)	D-7	1	8		470	
Total Solids (TS)	D-7	1	395		2,000	
Vanadium	D-7	1	0.016		<0.002	
Yttrium	D-7	1	<0.002		0.26	
Conventional Pollutants						
Oil and Grease	D-7	1	<1		17	
Total Suspended Solids (TSS)	D-7	1	<1		500	
pH (standard units)	D-7	1	7.14		6.81	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12, 14-22, 24-43, 45-65, 67-80, and 82-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, 121, and 129.

Table V-61

NICKEL-COBALT
METAL POWDER PRODUCTION ATOMIZATION WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	2,594	622.0	0.0	1,277	306.3
2	2,020	484.0	0.0	2,020	484.4
3	NR	NR	NR	2,429	582.5
4	2,623	628.9	0.0	2,623	628.9
1	8,840	2,120	0.0	5,291	1,269
5	16,960	4,066	0.0	16,960	4,066
6	75,270	18,050	0.0	75,270	18,050
Average	18,050	4,329		15,120	3,627

NR - Data not reported

Table V-62

NICKEL-COBALT METAL POWDER PRODUCTION ATOMIZATION WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	D-19	1	<0.003	<0.003		
115. arsenic	D-19	1	<0.003	<0.003		
	S-3	2	<0.01	<0.01		
117. beryllium	D-19	1	<0.0005	<0.0005		
	BJ-1	2	-	<0.05		
118. cadmium	D-19	1	<0.002	0.008		
	S-3	2	<0.05	<0.05		
	BJ-1	2	-	0.004		
119. chromium (total)	D-19	1	0.042	1.0		
	S-3	2	<0.05	54.9		
	T-1	6	<0.01	8.3	0.22	0.026
	BJ-1	2	-	0.38		
120. copper	D-19	1	0.068	<0.031		
	S-3	2	<0.05	2.080		
	T-1	6	0.048	45.000	5.400	0.0044
	BJ-1	2	-	3.200		
121. cyanide (total)	S-3	1	<0.01	<0.01		
	T-1	1	<0.01		<0.01	<0.01
122. lead	D-19	1	<0.084	<0.084		
	S-3	2	<0.1	<0.1		
	T-1	6	<0.005	<0.005	<0.005	<0.0054
	BJ-1	2	-	0.240		
123. mercury	D-19	1	<0.0002	<0.0002		
	S-3	2	<0.0002	<0.0002		
124. nickel	D-19	1	<0.003	0.42		
	S-3	2	<0.200	180.0		
	T-1	6	0.075	81.0	1.600	1.100
	BJ-1	2	-	210.0		

Table V-62 (Continued)

NICKEL-COBALT METAL POWDER PRODUCTION ATOMIZATION WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
125. selenium	D-19	1	<0.003	<0.003		
126. silver	D-19	1	<0.001	0.006		
127. thallium	D-19	1	<0.003	0.006		
128. zinc	D-19	1	0.038	0.22		
	S-3	2	<0.05	0.231		
	BJ-1	2	—	0.330		
Nonconventional Pollutants						
Acidity	D-19	1	<1	<1		
	T-1	6	0	-	0	0
Alkalinity	D-19	1	180	4.1		
Aluminum	D-19	1	<0.050	<0.050		
	S-3	2	<0.2	0.292		
	T-1	6	0.14	0.630	0.110	0.041

Table V-62 (Continued)

NICKEL-COBALT METAL POWDER PRODUCTION ATOMIZATION WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	D-19	1	<1	<1		
Barium	D-19	1	0.12	<0.001		
Boron	D-19	1	<0.009	0.15		
Calcium	D-19	1	63	1.4		
Chemical Oxygen Demand	D-19	1	<5	<5		
Chloride	D-19	1	34	<0.01		
Cobalt	D-19	1	<0.006	5.2		
	S-3	2	<0.1	0.270		
	T-1	6	<0.01	11.000	0.250	0.240
	BJ-1	2	-	0.100		
Fluoride	D-19	1	0.45	.11		
	S-3	2	<0.1	<0.1		
	T-1	6	1.01		0.89	0.95
	BJ-1	2	-	<0.1		
Iron	D-19	1	0.066	0.29		
	S-3	2	0.122	142.0		
	T-1	6	0.27	40.0	0.46	0.280
	BJ-1	2	-	10.3		
Magnesium	D-19	1	24	0.51		
Manganese	D-19	1	0.012	0.22		
Molybdenum	D-19	1	0.030	3.1		
	BJ-1	2	-	2.9		
Phosphate	D-19	1	<4	<4		
Sodium	D-19	1	9.5	1.3		
Sulfate	D-19	1	53	8.7		

Table V-62 (Continued)

NICKEL-COBALT METAL POWDER PRODUCTION ATOMIZATION WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Tin	D-19	1	<0.12	<0.12		
Titanium	D-19	1	<0.005	0.031		
	BJ-1	2	-	0.210		
Total Dissolved Solids (TDS)	D-19	1	393	9,000		
Total Organic Carbon (TOC)	D-19	1	8	2		
Total Solids (TS)	D-19	1	395	10,000		
Vanadium	D-19	1	0.016	0.017		
Yttrium	D-19	1	<0.002	0.002		

Table V-62 (Continued)

NICKEL-COBALT METAL POWDER PRODUCTION ATOMIZATION WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	D-19	1	<1	<1		
	S-3	1	<1	<1		
	T-1	1	<0.1;0.4	0.1;1.1	0.1;6.1	0.3;5.1
Total Suspended Solids (TSS)	D-19	1	<1	<1		
	S-3	2	<0.1	317		
	T-1	6	1.0		10.0	12.0
pH (standard units)	D-19	1	7.14	5.54		
	S-1	2		7.2-8.3		
	T-1	6	7.7		7.7	7.76

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

2. Note that stream code T-1 also appears on the metal powders metal powder production wet atomization wastewater raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

Table V-63

NICKEL-COBALT STATIONARY CASTING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	7,193	1,725	100	0.00	0.00
2	17,030	4,084	0.0	16,755	4,018
Average	12,112	2,904		16,755	4,018

Table V-64

NICKEL-COBALT VACUUM MELTING STEAM CONDENSATE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	0.00	0.00
2	6,955	1,665	98.0	139.0	33.33
Average	6,955	1,665		139.0	33.33

NR - Data not reported

Table V-65

NICKEL-COBALT VACUUM MELTING STEAM CONDENSATE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
5. benzidine	E-4	1	0.762		**	
11. 1,1,1-trichloroethane	E-4	1	0.005		0.001	
12. hexachloroethane	E-4	1	ND		0.004	
23. chloroform	E-4	1	0.015		ND	
28. 3,3'-dichlorobenzidine	E-4	1	0.001		ND	
36. 2,6-dinitrotoluene	E-4	1	ND		0.002	
37. 1,2-diphenylhydrazine	E-4	1	0.001		ND	
43. bis(2-choroethoxy)methane	E-4	1	0.001		ND	
55. naphthalene	E-4	1	0.001		0.001	
61. N-nitrosodimethylamine	E-4	1	0.001		ND	
63. N-nitrosodi-n-propylamine	E-4	1	0.024		0.018	
66. bis(2-ethylhexyl) phthalate	E-4	1	0.001		0.001	
67. butyl benzyl phthalate	E-4	1	0.001		ND	
70. diethyl phthalate	E-4	1	**		**	
114. antimony	E-4	1	<0.005		<0.005	
115. arsenic	E-4	1	<0.005		<0.005	
117. beryllium	E-4	1	<0.010		<0.010	
118. cadmium	E-4	1	<0.050		<0.050	
119. chromium (total)	E-4	1	<0.100		<0.100	
120. copper	E-4	1	0.080		0.060	
121. cyanide (total)	E-4	1	<0.02		<0.02	
122. lead	E-4	1	<0.100		<0.100	

Table V-65 (Continued)

NICKEL-COBALT VACUUM MELTING STEAM CONDENSATE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	E-4	1	<0.0010		<0.0010	
124. nickel	E-4	1	<0.100		<0.100	
125. selenium	E-4	1	<0.010		<0.010	
126. silver	E-4	1	<0.002		<0.002	
127. thallium	E-4	1	<0.002		<0.002	
128. zinc	E-4	1	<0.050		0.050	
Nonconventional Pollutants						
Acidity	E-4	1	<1		<1	
Alkalinity	E-4	1	83		16	
Aluminum	E-4	1	0.300		0.140	
Ammonia Nitrogen	E-4	1	0.22		0.23	
Barium	E-4	1	0.060		<0.020	
Boron	E-4	1	0.170		<0.100	
Calcium	E-4	1	33.0		10.3	
Chemical Oxygen Demand	E-4	1	34		<0.02	
Chloride	E-4	1	26		6.3	
Cobalt	E-4	1	<0.100		<0.100	
Fluoride	E-4	1	0.44		1.7	
Iron	E-4	1	1.00		0.05	
Magnesium	E-4	1	15.8		3.4	

Table V-65 (Continued)

NICKEL-COBALT VACUUM MELTING STEAM CONDENSATE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	E-4	1	0.140		0.280	
Molybdenum	E-4	1	<0.200		<0.200	
Phenolics	E-4	1	0.014		0.006	
Phosphate	E-4	1	16		11	
Sodium	E-4	1	33.0		10.2	
Sulfate	E-4	1	170		58	
Tin	E-4	1	<0.200		<0.200	
Titanium	E-4	1	<0.020		<0.020	
Total Dissolved Solids (TDS)	E-4	1	330		32	
Total Organic Carbon (TOC)	E-4	1	<1		<1	
Total Solids (TS)	E-4	1	380		46	
Vanadium	E-4	1	<0.010		<0.010	
Yttrium	E-4	1	<0.020		<0.020	
Conventional Pollutants						
Oil and Grease	E-4	1	<1		6	
Total Suspended Solids (TSS)	E-4	1	29		4.3	
pH (standard units)	E-4	1	6.71		6.20	

1. The following toxic pollutants were not detected in this waste stream: 1-4, 6-10, 13-22, 24-27, 29-35, 38-42, 44-54, 56-60, 62, 64, 65, 68, 69, and 71-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-66

NICKEL-COBALT ANNEALING AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
12	NR	NR	100	0.00	0.00
2	133.4	32.00	0.0	0.00	0.00
1	7,028	1,685	100	0.00	0.00
3	19,060	4,571	<100	0.00	0.00
1	2,002	480.1	100	0.00	0.00
1	0.27	0.06	0.0	0.27	0.06
1	NR	NR	NR	2.82	0.68
3	111,000	26,560	99.99	13.56	3.25
4	NR	NR	NR	45.00	10.79
5	444.6	106.6	0.0	222.3	53.31
6	697.6	167.3	0.0	697.6	167.3
7	NR	NR	P	760.6	182.4
8	1,334	319.9	0.0	1,334	319.9
9	3,236	776.1	0.0	3,236	776.1
10	3,470	832.2	0.0	3,470	832.2
11	171,500	41,120	95.6	7,621	1,828
13	178,900	42,910	0.0	178,900	42,910
14	NR	NR	NR	NR	NR
15	NR	NR	0.0	NR	NR
16	NR	NR	NR	NR	NR
17	NR	NR	NR	NR	NR
Average	38,370	9,197		16,360	3,924

P - Periodic discharge
NR - Data not reported

Table V-67

NICKEL-COBALT ANNEALING AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	F-17	1	0.014		ND	
44. methylene chloride	F-17	1	0.002		0.267	
55. naphthalene	F-17	1	0.001		ND	
66. bis(2-ethylhexyl) phthalate	F-17	1	ND		0.005	
114. antimony	D-8	1	<0.003		<0.003	
	F-17	1	<0.002		<0.002	
115. arsenic	D-8	1	<0.003		<0.003	
	F-17	1	<0.005		<0.005	
117. beryllium	D-8	1	<0.0005		<0.0005	
	F-17	1	<0.010		<0.010	
118. cadmium	D-8	1	<0.002		<0.002	
	F-17	1	<0.050		<0.050	
119. chromium (total)	D-8	1	0.042		0.10	
	F-17	1	<0.100		<0.100	
120. copper	D-8	1	0.068		0.028	
	F-17	1	0.170		2.92	
121. cyanide	F-17	1	<0.02		<0.02	
122. lead	D-8	1	<0.084		<0.084	
	F-17	1	<0.100		<0.100	
123. mercury	D-8	1	<0.0002		<0.0002	
	F-17	1	<0.0020		<0.0020	
124. nickel	D-8	1	<0.003		0.49	
	F-17	1	0.200		6.80	
125. selenium	D-8	1	<0.003		<0.003	
	F-17	1	<0.010		<0.010	

Table V-67 (Continued)

NICKEL-COBALT ANNEALING AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	D-8	1	<0.001		<0.001	
	F-17	1	<0.002		0.003	
127. thallium	D-8	1	<0.003		<0.003	
	F-17	1	<0.005		0.006	
128. zinc	D-8	1	<0.038		0.018	
	F-17	1	<0.050		0.760	
Nonconventional Pollutants						
Acidity	D-8	1	<1		<1	
	F-17	1	<1		<1	
Alkalinity	D-8	1	180		170	
	F-17	1	61		98	
Aluminum	D-8	1	<0.050		<0.050	
	F-17	1	0.910		0.840	
Ammonia Nitrogen	D-8	1	<1		0.14	
	F-17	1	0.04		0.04	
Barium	D-8	1	0.12		0.14	
	F-17	1	0.080		0.020	
Boron	D-8	1	<0.009		<0.009	
	F-17	1	<0.100		4.11	
Calcium	D-8	1	63		60	
	F-17	1	46.2		41.3	
Chemical Oxygen Demand	D-8	1	<5		<5	
	F-17	1	<1		4,000	
Chloride	D-8	1	34		45	
	F-17	1	12		23	
Cobalt	D-8	1	<0.006		0.046	
	F-17	1	<0.100		<0.100	

Table V-67 (Continued)

NICKEL-COBALT ANNEALING AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Fluoride	D-8	1	0.45		1.8	
	F-17	1	0.43		9.6	
Iron	D-8	1	0.066		0.17	
	F-17	1	1.37		19.2	
Magnesium	D-8	1	24		26	
	F-17	1	12.7		9.30	
Manganese	D-8	1	0.012		0.050	
	F-17	1	0.080		5.50	
Molybdenum	D-8	1	0.030		1.5	
	F-17	1	<0.200		2.00	
Phenolics	F-17	1	<0.005		<0.005	
Phosphate	D-8	1	<4		<4	
	F-17	1	<4		29,000	
Sodium	D-8	1	9.5		12	
	F-17	1	154		26.8	
Sulfate	D-8	1	53		60	
	F-17	1	130		81	
Tin	D-8	1	<0.12		<0.12	
	F-17	1	<0.200		<0.200	
Titanium	D-8	1	<0.005		<0.005	
	F-17	1	<0.020		0.040	
Total Dissolved Solids (TDS)	D-8	1	393		510	
	F-17	1	320		430	
Total Organic Carbon (TOC)	D-8	1	8		13	
	F-17	1	2		1,340	
Total Solids (TS)	D-8	1	395		570	
	F-17	1	330		3,500	
Vanadium	D-8	1	0.016		<0.003	
	F-17	1	<0.010		<0.010	

Table V-67 (Continued)

NICKEL-COBALT ANNEALING AND SOLUTION HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	D-8	1	<0.002		<0.002	
	F-17	1	<0.020		<0.020	
Conventional Pollutants						
Oil and Grease	D-8	1	<1		40	
	F-17	1	<1		7	
Total Suspended Solids (TSS)	D-8	1	<1		33	
	F-17	1	22		78	
pH (standard units)	D-8	1	7.14		7.00	
	F-17	1	6.64		7.37	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-43, 45-54, 56-65, and 67-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-68

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS

Plant	Wastewater Discharge** L/kkg	gal/ton
1	0.00	0.00
2	0.00	0.00
3	0.00	0.00
4	0.00	0.00
5	0.00	0.00
6	0.00	0.00
7	0.00	0.00
7	0.00	0.00
8	2.22	0.53
9	2.64	0.63
10	4.89	1.17
11	6.71	1.61
10	8.16	1.96
12	14.41	3.46
10	15.98	3.83
13	25.72	6.17
14	26.72	6.41
10	44.30	10.62
10	63.74	15.29
10	91.80	22.01
15	100.1	24.00
16	128.3	30.77
10	229.5	55.04
17	231.7	55.57
18	259.2	62.17
19	292.0	70.10
20	819.0	196.0
21	881.9	211.5
22	934.1	224.0
23	1,186	284.4
24	4,612	1,106
8	5,560	1,333
25	7,832	1,878
26	NR	NR
22	NR	NR
27	NR	NR
28	NR	NR
29	NR	NR
30	NR	NR
Average	934.9	224.2

NR - Data not reported
**Volume of spent bath per mass of nickel surface treated.

Table V-69

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	D-13	1	<0.003	<0.003		
	F-28	1	<0.003			0.480
	F-29	1	<0.002			0.040
	F-30	1	<0.002			0.066
115. arsenic	D-13	1	<0.003	<0.003		
	F-28	1	<0.005			1.40
	F-29	1	<0.005			0.070
	F-30	1	0.005			0.280
117. beryllium	D-13	1	<0.0005	0.45		
	F-28	1	<0.010			<0.010
	F-29	1	<0.010			<0.010
	F-30	1	<0.010			<0.010
118. cadmium	D-13	1	<0.002	600		
	F-28	1	<0.050			<0.050
	F-29	1	<0.050			<0.050
	F-30	1	<0.050			0.970
119. chromium (total)	D-13	1	0.042	3,600		
	F-28	1	<0.100			23.8
	F-29	1	<0.100			312
	F-30	1	<0.100			940
120. copper	D-13	1	0.068	130		
	F-28	1	0.170			20.4
	F-29	1	0.170			1.89
	F-30	1	0.170			4,800
121. cyanide	F-28	1	<0.02			<0.02
	F-29	1	<0.02			<0.02
	F-30	1	<0.02			<0.02
122. lead	D-13	1	<0.084	17		
	F-28	1	<0.100			0.360
	F-29	1	<0.100			0.360
	F-30	1	<0.100			<0.100
123. mercury	D-13	1	<0.0002	0.0014		
	F-28	1	<0.0020			<0.0020
	F-29	1	<0.0020			<0.0020
	F-30	1	<0.0020			<0.0020

Table V-69 (Continued)

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
124. nickel	D-13	1	<0.003	39,000		
	F-28	1	0.200			124
	F-29	1	0.200			272
	F-30	1	0.200			193,000
125. selenium	D-13	1	<0.003	<0.003		
	F-28	1	<0.010			<0.010
	F-29	1	<0.010			0.080
	F-30	1	<0.010			<0.010

Table V-69 (Continued)

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	D-13	1	<0.001	0.016		
	F-28	1	<0.002			0.008
	F-29	1	<0.002			0.002
	F-30	1	<0.002			0.096
127. thallium	D-13	1	<0.005	0.088		
	F-28	1	<0.005			<0.005
	F-29	1	<0.005			<0.005
	F-30	1	<0.005			0.050
128. zinc	D-13	1	0.038	39		
	F-28	1	<0.050			1.86
	F-29	1	<0.050			0.240
	F-30	1	<0.050			83.2
Nonconventional Pollutants						
Acidity	D-13	1	<1	185		
	F-28	1	<1			<1
	F-29	1	<1			1,500
	F-30	1	<1			>1,000
Alkalinity	D-13	1	180	<1		
	F-28	1	61			>8,000
	F-29	1	61			<1
	F-30	1	61			<1
Aluminum	D-13	1	<0.050	190		
	F-28	1	0.910			73.5
	F-29	1	0.910			312
	F-30	1	0.910			2.31
Ammonia Nitrogen	D-13	1	<1	<1		
	F-28	1	0.04			0.03
	F-29	1	0.04			8.5
	F-30	1	0.04			0.48
Barium	D-13	1	0.12	2.7		
	F-28	1	0.080			0.510
	F-29	1	0.080			0.680
	F-30	1	0.080			0.270

Table V-69 (Continued)

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	D-13	1	<0.009	1,700		
	F-28	1	<0.100			5,100
	F-29	1	<0.100			3,890
	F-30	1	<0.100			53.3
Calcium	D-13	1	63	54		
	F-28	1	46.2			359
	F-29	1	46.2			42.8
	F-30	1	46.2			412
Chemical Oxygen Demand	D-13	1	<5	<5		
	F-28	1	<1			620
	F-29	1	<1			15,000
	F-30	1	<1			390

Table V-69 (Continued)

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chloride	D-13	1	34	260		
	F-28	1	12			330
	F-29	1	12			6.5
	F-30	1	12			10,000
Cobalt	D-13	1	<0.006	4,000		
	F-28	1	<0.100			<0.100
	F-29	1	<0.100			0.180
	F-30	1	<0.100			4.00
Fluoride	D-13	1	0.45	94,000		
	F-28	1	0.43			14
	F-29	1	0.43			33
	F-30	1	0.43			3,400
Iron	D-13	1	0.066	4,000		
	F-28	1	1.37			180
	F-29	1	1.37			300
	F-30	1	1.37			2,500
Magnesium	D-13	1	24	6.8		
	F-28	1	12.7			192
	F-29	1	12.7			164
	F-30	1	12.7			178
Manganese	D-13	1	0.012	240		
	F-28	1	0.080			6.50
	F-29	1	0.080			6.62
	F-30	1	0.080			174
Molybdenum	D-13	1	0.030	910		
	F-28	1	<0.200			0.810
	F-29	1	<0.200			9.25
	F-30	1	<0.200			130
Phenolics	F-28	1	<0.005			<0.005
	F-29	1	<0.005			<0.005
	F-30	1	<0.005			<0.005
Phosphate	D-13	1	<4	<4		
	F-28	1	<4			40
	F-29	1	<4			150
	F-30	1	<4			<4

Table V-69 (Continued)

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sodium	D-13	1	9.5	1,600		
	F-28	1	154			5,800
	F-29	1	154			5,500
	F-30	1	154			7,700
Sulfate	D-13	1	53	<0.5		
	F-28	1	130			3,100
	F-29	1	130			4,700
	F-30	1	130			46,000

Table V-69 (Continued)

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Tin	D-13	1	<0.12	<0.12		
	F-28	1	<0.200			<0.200
	F-29	1	<0.200			<0.200
	F-30	1	<0.200			<0.200
Titanium	D-13	1	<0.005	3,300		
	F-28	1	<0.020			2.06
	F-29	1	<0.020			36.5
	F-30	1	<0.020			104
Total Dissolved Solids (TDS)	D-13	1	393	200,000		
	F-28	1	320			36,000
	F-29	1	320			59,000
	F-30	1	320			180,000
Total Organic Carbon (TOC)	D-13	1	8	130		
	F-28	1	2			27
	F-29	1	2			24,000
	F-30	1	2			89
Total Solids (TS)	D-13	1	395	350,000		
	F-28	1	330			38,000
	F-29	1	330			75,000
	F-30	1	330			190,000
Vanadium	D-13	1	<0.005	260		
	F-28	1	<0.010			0.110
	F-29	1	<0.010			0.540
	F-30	1	<0.010			0.031
Yttrium	D-13	1	<0.005	0.35		
	F-28	1	<0.020			<0.020
	F-29	1	<0.020			<0.020
	F-30	1	<0.020			<0.020
Conventional Pollutants						
Oil and Grease	D-13	1	<1	<1		
	F-28	1	<1			120
	F-29	1	<1			66
	F-30	1	<1			<1

Table V-69 (Continued)

NICKEL-COBALT SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)						
Total Suspended Solids (TSS)	D-13	1	<1	<1		
	F-28	1	22			5,800
	F-29	1	22			2,700
	F-30	1	22			340
pH (standard units)	D-13	1	7.14	1.72		
	F-28	1	6.64			7.87
	F-29	1	6.64			1.21
	F-30	1	6.64			0.89

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-70

NICKEL-COBALT SURFACE TREATMENT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	168.4	40.38	<100	0.00	0.00
9	11.06	2.65	0.0	11.06	2.65
10*	28.82	6.91	0.0	28.82	6.91
11	67.83	16.27	0.0	67.83	16.27
12	100.1	24.00	0.0	100.1	24.00
13	186.3	44.67	0.0	186.3	44.67
14	459.9	110.3	0.0	459.9	110.3
15	513.2	123.1	0.0	513.2	123.1
13	806.5	193.4	0.0	806.5	193.4
2	835	200	0.0	835	200
14	1,030	247.0	0.0	1,030	247.0
13	1,051	252.0	0.0	1,051	252.0
16	1,390	333.3	0.0	1,390	333.3
17	2,503	600.3	0.0	2,503	600.3
18	3,260	781.8	0.0	3,260	781.8
18	4,141	993.1	0.0	4,141	993.1
19	4,689	1,124	0.0	4,689	1,124
20	19,540	4,687	0.0	19,540	4,687
21	27,730	6,649	0.0	27,730	6,649
22	34,010	8,157	0.0	34,010	8,157
18	46,240	11,090	0.0	46,240	11,090
23	80,360	19,270	0.0	79,830	19,140
24	127,000	30,460	0.0	127,000	30,460
25	209,300	50,200	0.0	209,300	50,200
26	NR	NR	0.0	NR	NR
28	NR	NR	0.0	NR	NR
3	NR	NR	NR	NR	NR
4	NR	NR	NR	NR	NR
5	NR	NR	NR	NR	NR
6	NR	NR	NR	NR	NR
7	NR	NR	NR	NR	NR
8	NR	NR	NR	NR	NR
27	NR	NR	NR	NR	NR
Average	23,560	5,650		24,550	5,889

NR - Data not reported.

*Nickel forming no longer performed by this plant.

Table V-71

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
5. benzidine	E-8	1	0.762			0.965
11. 1,1,1-trichloroethane	E-8	1	0.005			0.020
12. hexachloroethane	E-8	1	ND			0.006
23. chloroform	E-8	1	0.015			ND
28. 3,3'-dichlorobenzidine	E-8	1	0.001			ND
36. 2,6-dinitrotoluene	E-8	1	0.002			0.002
37. 1,2-diphenylhydrazine	E-8	1	0.001			ND
43. bis(2-chloroethoxy)methane	E-8	1	0.001			**
55. naphthalene	E-8	1	0.001			0.001
61. N-nitrosodimethylamine	E-8	1	0.001			0.001
62. N-nitrosodiphenylamine	E-8	1	ND			0.196
63. N-nitrosodi-n-propylamine	E-8	1	0.024			0.023
66. bis(2-ethylhexyl) phthalate	E-8	1	0.001			0.002
67. butyl benzyl phthalate	E-8	1	0.001			0.001
70. diethyl phthalate	E-8	1	**			**
71. dimethyl phthalate	E-8	1	ND			0.003
81. phenanthrene	E-8	1	ND			0.001

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
114. antimony	D-10	6	<0.003	<0.003	<0.003	<0.003
	E-2	2	<0.005	<0.005	<0.005	<0.005
	E-8	1	<0.005	<0.005		<0.005
	F-7	4	<0.002	0.002	<0.002	0.019
	F-8	4	<0.002	0.002	0.002	<0.002
	F-9	3	<0.002	0.160	0.016	<0.002
	F-10	3	<0.002	0.011	0.013	<0.002
	F-11	3	<0.002	0.050	0.013	<0.002
115. arsenic	D-10	6	<0.003	<0.003	<0.003	<0.003
	E-2	2	<0.005	<0.005	<0.005	<0.005
	E-8	1	<0.005	<0.005		<0.005
	F-7	4	<0.005	<0.005	<0.005	0.012
	F-8	4	<0.002	0.002	0.002	<0.002
	F-9	3	<0.005	0.030	<0.005	<0.005
	F-10	3	<0.005	<0.005	<0.005	<0.005
	F-11	3	<0.002	0.050	0.013	<0.002
117. beryllium	D-10	6	<0.0005	0.002	<0.0005	0.0005
	E-2	2	<0.010	<0.010	<0.010	<0.010
	E-8	1	<0.010	<0.010		<0.010
	F-7	4	<0.010	<0.010	<0.010	<0.010
	F-8	4	<0.010	<0.010	<0.020	<0.010
	F-9	3	<0.010	<0.010	<0.010	<0.010
	F-10	3	<0.010	<0.010	<0.010	<0.010
	F-11	3	<0.010	<0.010	<0.010	<0.010

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
118. cadmium	D-10	6	<0.002	1.2	0.28	0.39
	E-2	2	<0.050	<0.050	<0.050	<0.050
	E-8	1	<0.050	<0.050		<0.050
	F-7	4	<0.050	<0.050	<0.050	<0.050
	F-8	4	<0.050	<0.050	<0.020	<0.050
	F-9	3	<0.050	<0.050	<0.050	<0.050
	F-10	3	<0.050	<0.050	<0.050	<0.050
	F-11	3	<0.050	<0.050	<0.050	<0.050
119. chromium (total)	D-10	6	0.042	11	2.6	3.6
	E-2	2	<0.100	<0.100	0.180	<0.100
	E-8	1	<0.100	2.15		7.90
	F-7	4	<0.100	9.31	5.31	18.8
	F-8	4	<0.100	8.15	7.20	8.40
	F-9	3	<0.100	9.18	1.98	2.72
	F-10	3	<0.100	2.86	3.76	1.76
	F-11	3	<0.100	1.33	1.46	6.20
120. copper	D-10	6	0.068	0.38	0.18	0.22
	E-2	2	0.080	0.080	0.800	0.590
	E-8	1	0.080	14.0		87.4
	F-7	4	0.170	37.6	20.0	53.5
	F-8	4	0.170	2.21	3.80	4.08
	F-9	3	0.170	22.4	11.5	16.5
	F-10	3	0.170	29.6	40.5	21.5
	F-11	3	0.170	14.0	14.1	52.5
121. cyanide (total)	E-2	2	<0.02	<0.02	<0.02	<0.02
	E-8	1	<0.02	<0.02		<0.02
	F-7	4	<0.02	<0.02	<0.02	<0.02
	F-8	4	<0.02	<0.02	<0.02	<0.02
	F-9	3	<0.02	<0.02	<0.02	<0.02
	F-10	3	<0.02	<0.02	<0.02	<0.02
	F-11	3	<0.02	<0.02	<0.02	<0.02

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
122. lead	D-10	6	<0.084	0.26	0.10	<0.084
	E-2	2	<0.100	<0.100	<0.100	<0.100
	E-8	1	<0.100	<0.100		<0.100
	F-7	4	<0.100	0.180	<0.100	0.180
	F-8	4	<0.100	<0.100	<0.200	<0.100
	F-9	3	<0.100	0.340	<0.100	<0.100
	F-10	3	<0.100	<0.100	0.120	<0.100
	F-11	3	<0.100	<0.100	<0.100	<0.100
123. mercury	D-10	6	<0.0002	0.0002	<0.0002	0.0004
	E-2	2	<0.0010	<0.0010	<0.0010	<0.0010
	E-8	1	<0.0010	<0.0010		<0.0010
	F-7	4	<0.0020	<0.0020	<0.0020	<0.0020
	F-8	4	<0.0020	<0.0020	<0.0020	<0.0020
	F-9	3	<0.0020	<0.0020	<0.0020	<0.0020
	F-10	3	<0.0020	<0.0020	<0.0020	<0.0020
	F-11	3	<0.0020	<0.0020	<0.0020	<0.0020
124. nickel	D-10	6	<0.003	76	18	25
	E-2	2	<0.100	0.300	2.20	1.30
	E-8	1	<0.100	24.6		183
	F-7	4	0.200	174	124	364
	F-8	4	0.200	7.04	12.0	19.4
	F-9	3	0.200	105	51.2	96.8
	F-10	3	0.200	107	159	97.0
	F-11	3	0.200	4.59	57.6	196
125. selenium	D-10	6	<0.003	<0.003	<0.003	<0.003
	E-2	2	<0.010	<0.010	<0.010	<0.010
	E-8	1	<0.010	<0.010		<0.010
	F-7	4	<0.010	<0.010	<0.010	<0.010
	F-8	4	<0.010	<0.010	<0.010	<0.010
	F-9	3	<0.010	<0.010	<0.010	<0.010
	F-10	3	<0.010	<0.010	<0.010	<0.010
	F-11	3	<0.010	<0.010	<0.010	<0.010

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	D-10	6	<0.001	<0.001	0.003	0.002
	E-2	2	<0.002	<0.002	<0.002	<0.002
	E-8	1	<0.002	<0.002		<0.002
	F-7	4	<0.002	<0.002	<0.002	<0.002
	F-8	4	<0.002	0.012	<0.002	<0.002
	F-9	3	<0.002	<0.002	<0.002	<0.002
	F-10	3	<0.002	<0.002	<0.002	<0.002
	F-11	3	<0.002	<0.002	<0.002	<0.002
127. thallium	D-10	6	<0.003	<0.003	<0.003	<0.003
	E-2	2	<0.002	<0.002	<0.002	0.003
	E-8	1	<0.002	<0.002		<0.002
	F-7	4	<0.005	<0.005	<0.005	0.019
	F-8	4	<0.005	<0.005	<0.002	<0.005
	F-9	3	<0.005	<0.005	<0.005	<0.005
	F-10	3	<0.005	<0.005	<0.005	<0.005
	F-11	3	<0.005	<0.005	<0.005	<0.005
128. zinc	D-10	6	0.038	0.16	0.071	0.065
	E-2	2	<0.050	<0.050	<0.050	<0.050
	E-8	1	<0.050	0.370		1.400
	F-7	4	<0.050	1.01	0.670	2.36
	F-8	4	<0.050	0.200	0.220	0.270
	F-9	3	<0.050	0.810	0.400	0.230
	F-10	3	<0.050	1.70	1.38	0.790
	F-11	3	<0.050	0.310	0.370	1.44

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	D-10	6	<1	15	49	85
	E-2	2	<1	<1	<1	<1
	E-8	1	<1	130		198
	F-7	4	<1	300	140	390
	F-8	4	<1	<1	<1	<1
	F-9	3	<1	10	140	140
	F-10	3	<1	130	130	190
	F-11	3	<1	<1	<1	87
Alkalinity	D-10	6	180	<1	<1	<1
	E-2	2	83	47	50	51
	E-8	1	83	<1		<1
	F-7	4	61	<1	<1	<1
	F-8	4	61	170	76	79
	F-9	3	61.	<1	<1	<1
	F-10	3	61	<1	<1	<1
	F-11	3	61	29	15	<1
Aluminum	D-10	6	<0.050	1.5	0.58	0.78
	E-2	2	0.300	0.100	0.120	0.060
	E-8	1	0.300	0.960		<0.020
	F-7	4	0.910	<0.020	<0.020	<0.020
	F-8	4	0.910	0.240		0.160
	F-9	3	0.910	2.76	0.220	0.020
	F-10	3	0.910	0.360	0.180	<0.020
	F-11	3	0.910	0.220	0.770	<0.020

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	D-10	6	<1	0.24	0.53	0.47
	E-2	2	0.22	3.3	25	6.2
	E-8	1	0.22	0.55		130
	F-7	4	0.04	0.26	0.18	0.16
	F-8	4	0.04	0.89	3.2	1.4
	F-9	3	0.04	14	13	14
	F-10	3	0.04	50	15	6.7
	F-11	3	0.04	0.31	0.35	1.5
Barium	D-10	6	0.12	0.15	0.23	0.10
	E-2	2	0.060	0.040	0.040	0.030
	E-8	1	0.060	0.030		0.040
	F-7	4	0.080	0.060	0.060	0.080
	F-8	4	0.080	0.060		0.070
	F-9	3	0.080	0.720	0.080	0.060
	F-10	3	0.080	0.060	0.040	0.040
	F-11	3	0.080	0.030	0.060	0.070
Boron	D-10	6	<0.009	0.97	<0.009	<0.009
	E-2	2	0.170	0.110	<0.100	<0.100
	E-8	1	0.170	0.200		0.470
	F-7	4	<0.100	0.440	0.220	1.34
	F-8	4	<0.100	0.550		0.830
	F-9	3	<0.100	0.680	0.420	0.240
	F-10	3	<0.100	1.32	8.82	0.510
	F-11	3	<0.100	0.110	0.460	0.840
Calcium	D-10	6	63	98	940	660
	E-2	1	33.0	24.0	25.9	24.5
	E-8	1	33.0	18.4		18.9
	F-7	4	46.2	32.0	32.1	37.0
	F-8	4	46.2	31.9		30.2
	F-9	3	46.2	38.2	32.7	32.1
	F-10	3	46.2	29.5	26.5	21.0
	F-11	3	46.2	13.8	21.2	30.9

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	D-10	6	<5	12	72	50
	E-2	2	34	10	18	57
	E-8	1	34	50		52
	F-7	4	<1	13	59	13
	F-8	4	<1	<1	71	27
	F-9	4	<1	97	50	24
	F-10	3	<1	36	77	19
	F-11	3	<1	110	230	82
Chloride	D-10	6	34	49	175	130
	E-2	2	26	<0.05	22	20
	E-8	1	26	35		78
	F-7	4	12	26	89	26
	F-8	4	12	81	37	37
	F-9	3	12	47	88	52
	F-10	3	12	130	190	65
	F-11	3	12	10	38	24
Cobalt	D-10	6	<0.006	4.0	1.2	1.7
	E-2	2	<0.100	<0.100	<0.100	<0.100
	E-8	1	<0.100	<0.100		<0.100
	F-7	4	<0.100	<0.100	<0.100	0.360
	F-8	4	<0.100	<0.100		<0.100
	F-9	3	<0.100	0.180	<0.100	0.140
	F-10	3	<0.100	<0.100	<0.100	<0.100
	F-11	3	<0.100	<0.100	<0.100	<0.100
Fluoride	D-10	6	0.45	0.91	1.1	210
	E-2	2	0.44	0.26	0.32	0.27
	E-8	1	0.44	0.40		0.52
	F-7	4	0.43	42	35	41
	F-8	4	0.43	3.2	5.7	7.4
	F-9	3	0.43	1.1	1.6	2.0
	F-10	3	0.43	0.85	1.2	0.74
	F-11	3	0.43	9.6	2.9	91

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	D-10	6	0.066	27	5.6	7.4
	E-2	2	1.00	0.696	0.750	0.380
	E-8	1	1.00	31.0		32.5
	F-7	4	1.37	37.6	35.0	117
	F-8	4	1.37	3.37		8.12
	F-9	3	1.37	22.4	13.1	17.1
	F-10	3	1.37	29.6	84.5	37.3
	F-11	3	1.37	8.30	11.3	26.4
Magnesium	D-10	6	24	25	18	17
	E-2	2	15.8	11.1	12.4	11.8
	E-8	1	15.8	6.0		6.20
	F-7	4	12.7	10.2	10.4	11.2
	F-8	4	12.7	9.54		8.35
	F-9	3	12.7	11.2	10.4	9.40
	F-10	3	12.7	7.66	6.33	6.23
	F-11	3	12.7	4.36	5.05	8.55

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	D-10	6	0.012	0.50	0.14	0.16
	E-2	2	0.140	0.050	0.020	<0.010
	E-8	1	0.140	0.630		2.00
	F-7	4	0.080	1.46	0.740	2.62
	F-8	4	0.080	0.620		0.710
	F-9	3	0.080	1.99	0.570	0.920
	F-10	3	0.080	1.90	2.28	1.65
	F-11	3	0.080	34.0	9.93	27.5
Molybdenum	D-10	6	0.030	9.6	17	13
	E-2	2	<0.200	<0.200	<0.200	<0.200
	E-8	1	<0.200	<0.200		<0.200
	F-7	4	<0.200	1.50	0.670	2.96
	F-8	4	<0.200	<0.200		0.270
	F-9	3	<0.200	1.20	0.250	<0.200
	F-10	3	<0.200	<0.200	<0.200	<0.200
	F-11	3	<0.200	<0.200	<0.200	<0.200
Phenolics	E-2	1	0.014	<0.005	0.082	0.008
	E-8	1	0.014	0.016		0.015
	F-7	1	<0.005	0.025	<0.005	<0.005
	F-8	1	<0.005	<0.005	0.009	<0.005
	F-9	1	<0.005	<0.005	<0.005	<0.005
	F-10	1	<0.005	0.045	0.025	<0.005
	F-11	1	<0.005	<0.005	0.019	<0.005
Phosphate	D-10	6	<4	<4	9	<4
	E-2	2	16	8	6.6	16
	E-8	1	16	<4		<4
	F-7	4	<4	<4	<4	<4
	F-8	4	<4	10	<4	<4
	F-9	3	<4	<4	<4	<4
	F-10	3	<4	<4	<4	<4
	F-11	3	<4	<4	<4	<4

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sodium	D-10	6	9.5	30	520	330
	E-2	2	33.0	20.0	26.6	27.0
	E-8	1	33.0	58.0		133
	F-7	4	154	28.0	28.6	43.0
	F-8	4	154	175		115
	F-9	3	154	35.0	49.0	61.0
	F-10	3	154	157	184	82.0
	F-11	3	154	107	134	184
Sulfate	D-10	6	53	140	2,400	2,200
	E-2	2	170	140	260	210
	E-8	1	170	700		1,300
	F-7	4	130	250	200	260
	F-8	4	130	170	150	130
	F-9	3	130	290	220	320
	F-10	3	130	520	770	400
	F-11	3	130	57	93	130
Tin	D-10	6	<0.12	1.7	1.1	1.6
	E-2	2	<0.200	<0.200	<0.200	<0.200
	E-8	1	<0.200	<0.200		<0.200
	F-7	4	<0.200	<0.200	<0.200	<0.200
	F-8	4	<0.200	<0.200		<0.200
	F-9	3	<0.200	<0.200	<0.200	<0.200
	F-10	3	<0.200	<0.200	<0.200	<0.200
	F-11	3	<0.200	<0.200	<0.200	<0.200
Titanium	D-10	6	<0.005	12	3.6	12
	E-2	2	<0.020	<0.020	0.020	<0.020
	E-8	1	<0.020	0.090		0.150
	F-7	4	<0.020	0.970	0.500	1.54
	F-8	4	<0.020	0.160		0.290
	F-9	3	<0.020	3.31	0.290	0.290
	F-10	3	<0.020	0.370	0.290	0.120
	F-11	3	<0.020	0.090	0.140	0.290

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Dissolved Solids (TDS)	D-10	6	393	800	4,900	3,800
	E-2	2	330	270	180	330
	E-8	1	330	920		2,000
	F-7	4	320	1,240	860	2,100
	F-8	4	320	670	490	560
	F-9	3	320	700	670	800
	F-10	3	320	1,300	1,800	870
	F-11	3	320	610	730	1,400
Total Organic Carbon (TOC)	D-10	6	8	38	46	13
	E-2	2	<1	<1	<1	<1
	E-8	1	<1	10		3.9
	F-7	4	2	3.8	2	4
	F-8	4	2	10	3	4
	F-9	3	2	3	4	4
	F-10	3	2	9	23	5
	F-11	2	2	45	35	

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Solids (TS)	D-10	6	395	900	5,700	4,200
	E-2	2	380	250	240	330
	E-8	1	380	930		2,070
	F-7	4	330	1,300	970	2,200
	F-8	4	330	820	530	570
	F-9	3	330	1,510	780	1,030
	F-10	3	330	1,510	1,800	1,110
	F-11	3	330	860	950	1,600
Vanadium	D-10	6	0.016	0.52	0.12	0.26
	E-2	2	<0.010	<0.010	<0.010	<0.010
	E-8	1	<0.010	<0.010		<0.010
	F-7	4	<0.010	<0.010	<0.010	0.015
	F-8	4	<0.010	<0.010		0.022
	F-9	3	<0.010	0.020	<0.020	<0.020
	F-10	3	<0.020	<0.010	<0.010	<0.010
	F-11	3	<0.010	<0.010	<0.010	<0.010
Yttrium	D-10	6	<0.002	0.015	0.004	0.009
	E-2	2	<0.020	<0.020	<0.020	<0.020
	E-8	1	<0.020	<0.020		<0.020
	F-7	4	<0.020	<0.020	<0.020	<0.020
	F-8	4	<0.020	<0.020		<0.020
	F-9	3	<0.020	<0.020	<0.020	<0.020
	F-10	3	<0.020	<0.020	<0.020	<0.020
	F-11	3	<0.020	<0.020	<0.020	<0.020
Conventional Pollutants						
Oil and Grease	D-10	1	<1		5	3
	E-2	1	<1	<1	3	<1
	E-8	1	<1	3		<1
	F-7	1	<1	7.8	3	3
	F-8	1	<1	7.0	5	<1
	F-9	1	<1	17	<1	<1
	F-10	1	<1	55	14	<1
	F-11	1	<1	130	43	<1

Table V-71 (Continued)

NICKEL-COBALT SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)						
Total Suspended Solids (TSS)	D-10	6	<1	100	760	150
	E-2	2	29	4	11	3.3
	E-8	1	29	7.4		7.3
	F-7	4	22	200	33	100
	F-8	4	22	110	40	96
	F-9	3	22	670	35	19
	F-10	3	22	80	12	6
	F-11	3	22	140	90	9
pH (standard units)	D-10	6	7.14	3.90	3.40	3.40
	E-2	2	6.71	6.39	7.35	7 16
	E-8	1	6.71	2.71		2.74
	F-7	4	6.64	2.79	3.36	2.41
	F-8	4	6.64	8.70	7.21	7.78
	F-9	3	6.64	3.39	3.28	2.75
	F-10	3	6.64	2.85	2.33	2.59
	F-11	3	6.64	5.69	5.24	3.03

**Present, but not quantifiable.

1. The following toxic pollutants were not detected in this waste stream: 1-4, 6-10, 13-22, 24-27, 29-35, 38-42, 44-54, 56-60, 64, 65, 68, 69, 72-80, and 82-88.

2. Note that stream code Y-4 also appers on the titanium surface treatment rinsewater raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

3. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-72

NICKEL-COBALT AMMONIA RINSE

Plant	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
2	11.66	2.80
1	12.84	3.08
2	19.76	4.74
Average	14.75	3.54

*Volume of spent rinse per mass of nickel-cobalt.

Table V-73

NICKEL-COBALT AMMONIA RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	F-19	1	0.014	ND		
44. methylene chloride	F-19	1	0.002	0.950		
55. naphthalene	F-19	1	0.001	ND		
68. di-n-butyl phthalate	F-19	1	ND	0.028		
114. antimony	F-19	1	<0.002	0.020		
115. arsenic	F-19	1	<0.005	0.160		
117. beryllium	F-19	1	<0.010	<0.010		
118. cadmium	F-19	1	<0.050	<0.050		
119. chromium (total)	F-19	1	<0.100	108		
120. copper	F-19	1	0.170	54.0		
121. cyanide	F-19	1	<0.02	<0.02		
122. lead	F-19	1	<0.100	0.540		
123. mercury	F-19	1	<0.0020	<0.0020		
124. nickel	F-19	1	0.200	456		
125. selenium	F-19	1	<0.010	0.070		
126. silver	F-19	1	<0.002	0.020		
127. thallium	F-19	1	<0.005	<0.005		
128. zinc	F-19	1	<0.050	32.0		
Nonconventional Pollutants						
Acidity	F-19	1	<1	<1		
Alkalinity	F-19	1	61	1,500		
Aluminum	F-19	1	0.910	160		

Table V-73 (Continued)

NICKEL-COBALT AMMONIA RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	F-19	1	0.040	<0.01		
Barium	F-19	1	0.080	<0.020		
Boron	F-19	1	<0.100	5.74		
Calcium	F-19	1	46.2	94.4		
Chemical Oxygen Demand (COD)	F-19	1	<1	840		
Chloride	F-19	1	12	6,500		
Cobalt	F-19	1	<0.100	<0.100		
Fluoride	F-19	1	0.43	1.5		
Iron	F-19	1	1.37	592		
Magnesium	F-19	1	12.7	17.4		
Manganese	F-19	1	0.080	50.7		
Molybdenum	F-19	1	<0.200	11.8		
Phenolics	F-19	1	<0.005	0.011		
Phosphate	F-19	1	<4	<4		
Sodium	F-19	1	154	770		
Sulfate	F-19	1	130	33,000		
Tin	F-19	1	<0.200	<0.200		
Titanium	F-19	1	<0.020	0.540		
Total Dissolved Solids (TDS)	F-19	1	320	32,000		
Total Organic Carbon (TOC)	F-19	1	2	16		

Table V-73 (Continued)

NICKEL-COBALT AMMONIA RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Solids (TS)	F-19	1	330	100,000		
Vanadium	F-19	1	<0.010	0.070		
Yttrium	F-19	1	<0.020	<0.020		
Conventional Pollutants						
Oil and Grease	F-19	1	<1	<1		
Total Suspended Solids (TSS)	F-19	1	22	9,000		
pH (standard units)	F-19	1	6.64	7.90		

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-43, 45-54, 56-67, and 69-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-74

NICKEL-COBALT ALKALINE CLEANING SPENT BATHS

Plant	Wastewater Discharge** L/kkg	gal/ton
1*	1.20	0.29
1*	2.00	0.48
2	2.64	0.63
3	4.00	0.96
4	4.08	0.98
5	10.7	2.56
4	12.84	3.08
4	33.91	8.13
6	37.91	9.09
4	56.68	13.59
7	90.61	21.73
4	114.8	27.52
8	131.0	31.40
4	196.7	47.17
9	213.3	51.15
10	NR	NR
11	NR	NR
12	NR	NR
13	NR	NR
14	NR	NR
15	NR	NR
16	NR	NR
17	NR	NR
Average	60.82	14.58

NR - Data not reported

*Nickel forming no longer performed at this plant.
**Volume of spent bath per mass of nickel cleaned.

Table V-75

NICKEL-COBALT ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	F-12	1	0.014	ND		
44. methylene chloride	F-12	1	0.002	3.550		
55. naphthalene	D-14	1	ND		ND	
	F-12	1	0.001	ND		
	F-14	1	0.001		ND	
	F-27	1	0.001		ND	
66. bis(2-ethylhexyl) phthalate	D-14	1	0.009		ND	
	F-12	1	ND	ND		
	F-14	1	ND		ND	
	F-27	1	ND		ND	
114. antimony	D-14	1	<0.003		<0.003	
	F-12	1	<0.002	0.043		
	F-14	1	<0.002		0.200	
	F-27	1	<0.002		0.020	
115. arsenic	D-14	1	<0.003		<0.003	
	F-12	1	<0.005	0.180		
	F-14	1	<0.005		<0.005	
	F-27	1	<0.005		0.070	
117. beryllium	D-14	1	<0.0005		<0.0005	
	F-12	1	<0.010	<0.010		
	F-14	1	<0.010		<0.010	
	F-27	1	<0.010		<0.010	
118. cadmium	D-14	1	<0.002		0.084	
	F-12	1	<0.050	<0.050		
	F-14	1	<0.050		<0.050	
	F-27	1	<0.050		<0.050	
119. chromium (total)	D-14	1	0.042		1.0	
	F-12	1	<0.100	3.59		
	F-14	1	<0.100		0.410	
	F-27	1	<0.100		38.0	

Table V-75 (Continued)

NICKEL-COBALT ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
120. copper	D-14	1	0.068		0.12	
	F-12	1	0.170	39.2		
	F-14	1	0.170		4.51	
	F-27	1	0.170		0.210	
121. cyanide (total)	F-12	1	<0.02	<0.02		
	F-14	1	<0.02		<0.02	
	F-27	1	<0.02		<0.02	
122. lead	D-14	1	<0.084		<0.084	
	F-12	1	<0.100	0.560		
	F-14	1	<0.100		<0.100	
	F-27	1	<0.100		<0.100	
123. mercury	D-14	1	<0.0002		<0.0002	
	F-12	1	<0.0020	<0.0020		
	F-14	1	<0.0020		<0.0020	
	F-27	1	<0.0020		<0.0020	
124. nickel	D-14	1	<0.003		4.8	
	F-12	1	0.200	122		
	F-14	1	0.200		16.6	
	F-27	1	0.200		0.100	
125. selenium	D-14	1	<0.003		<0.003	
	F-12	1	<0.010	0.080		
	F-14	1	<0.010		<0.010	
	F-27	1	<0.010		0.220	
126. silver	D-14	1	<0.001		<0.001	
	F-12	1	<0.002	0.005		
	F-14	1	<0.002		<0.002	
	F-27	1	<0.002		<0.002	
127. thallium	D-14	1	<0.003		0.006	
	F-12	1	<0.005	<0.005		
	F-14	1	<0.005		<0.005	
	F-27	1	<0.005		<0.005	
128. zinc	D-14	1	0.038		0.85	
	F-12	1	<0.050	3.90		
	F-14	1	<0.050		0.870	
	F-27	1	<0.050		0.050	

Table V-75 (Continued)

NICKEL-COBALT ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	D-14	1	<1		190	
	F-12	1	<1	<1		
	F-14	1	<1		<1	
	F-27	1	<1		<1	
Alkalinity	D-14	1	180		<1	
	F-12	1	61	3,800		
	F-14	1	61		29,000	
	F-27	1	61	150,000		
Aluminum	D-14	1	<0.050		1.1	
	F-12	1	0.910	5.90		
	F-14	1	0.910		1.38	
	F-27	1	0.910		11.9	
Ammonia Nitrogen	D-14	1	<1		0.33	
	F-12	1	0.04	1.4		
	F-14	1	0.04		<0.01	
	F-27	1	0.04		<0.01	
Barium	D-14	1	0.12		0.22	
	F-12	1	0.080	0.470		
	F-14	1	0.080		0.280	
	F-27	1	0.080		<0.010	
Boron	D-14	1	<0.009		1.4	
	F-12	1	<0.100	112		
	F-14	1	<0.100		88.0	
	F-27	1	<0.100		131	

Table V-75 (Continued)

NICKEL-COBALT ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Calcium	D-14	1	63		270	
	F-12	1	46.2	206		
	F-14	1	46.2		37.3	
	F-27	1	46.2		0.980	
Chemical Oxygen Demand (COD)	D-14	1	<5		250	
	F-12	1	<1	63,000		
	F-14	1	<1		3,200	
	F-27	1	<1		<1	
Chloride	D-14	1	34		66	
	F-12	1	12	930		
	F-14	1	12		58	
	F-27	1	12		1,160	
Cobalt	D-14	1	<0.006		1.0	
	F-12	1	<0.100	0.120		
	F-14	1	<0.100		<0.100	
	F-27	1	<0.100		<0.100	
Fluoride	D-14	1	0.45		1.3	
	F-12	1	0.43	7.7		
	F-14	1	0.43		2.1	
	F-27	1	0.43		1.9	
Iron	D-14	1	0.066		8.3	
	F-12	1	1.37	304		
	F-14	1	1.37		3.42	
	F-27	1	1.37		0.100	
Magnesium	D-14	1	24		40	
	F-12	1	12.7	106		
	F-14	1	12.7		10.2	
	F-27	1	12.7		0.550	
Manganese	D-14	1	0.012		0.62	
	F-12	1	0.080	11.0		
	F-14	1	0.080		1.67	
	F-27	1	0.080		7,440	
Molybdenum	D-14	1	0.030		1.2	
	F-13	1	<0.200	0.940		
	F-14	1	<0.200		<0.200	
	F-27	1	<0.200		0.970	

Table V-75 (Continued)

NICKEL-COBALT ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phenolics	F-12	1	<0.005	0.17		
	F-14	1	<0.005		0.45	
	F-27	1	<0.005		<0.005	
Phosphate	D-14	1	<4		7,000	
	F-12	1	<4	1,800		
	F-14	1	<4		<4	
	F-27	1	<4		<4	
Sodium	D-14	1	9.5		270	
	F-13	1	154	3,200		
	F-14	1	154		1,640	
	F-27	1	154		49,000	
Sulfate	D-14	1	53		400	
	F-12	1	130	2,100		
	F-14	1	130		7,900	
	F-27	1	130		2,500	
Tin	D-14	1	<0.12		<0.12	
	F-13	1	<0.200	<0.200		
	F-14	1	<0.200		<0.200	
	F-27	1	<0.200		<0.200	
Titanium	D-14	1	<0.005		0.66	
	F-12	1	<0.020	0.960		
	F-14	1	<0.020		0.720	
	F-27	1	<0.020		<0.020	
Total Dissolved Solids (TDS)	D-14	1	393		7,000	
	F-12	1	320	36,000		
	F-14	1	320		590,000	
	F-27	1	320		150,000	
Total Organic Carbon (TOC)	D-14	1	8		76	
	F-12	1	2	15,000		
	F-14	1	2		770	
	F-27	1	2		26	
Total Solids (TS)	D-14	1	395		7,600	
	F-12	1	330	43,000		
	F-14	1	330		630,000	
	F-27	1	330		260,000	

Table V-75 (Continued)

NICKEL-COBALT ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	D-14	1	0.016		0.050	
	F-12	1	<0.010	<0.010		
	F-14	1	<0.010		<0.010	
	F-27	1	<0.010		<0.010	
Yttrium	D-14	1	<0.002		<0.002	
	F-12	1	<0.020	<0.020		
	F-14	1	<0.020		<0.020	
	F-27	1	<0.020		<0.020	
Conventional Pollutants						
Oil and Grease	D-14	1	<1		22	
	F-14	1	<1		49	
	F-27	1	<1		170	
Total Suspended Solids (TSS)	D-14	1	<1		640	
	F-12	1	22	4,000		
	F-14	1	22		780	
	F-27	1	22		920	
pH (standard units)	D-14	1	7.14		2.30	
	F-12	1	6.64	8.45		
	F-14	1	6.64		9.52	
	F-27	1	6.64		12.80	

1. The folloiwng toxic pollutants were not detected in this waste stream: 1-10, 12-43, 45-54, 56-65, and 67-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-76

NICKEL-COBALT ALKALINE CLEANING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
3	168.4	40.38	<100	0.00	0.00
10*	6.95	1.67	0.0	6.95	1.67
4	30.29	7.26	0.0	30.29	7.26
10*	96.23	23.08	0.0	96.23	23.08
11	976.7	234.2	0.0	977	234.2
5	2,140	514	0.0	2,140	514
12	2,325	557.7	0.0	2,325	557.7
13	2,778	666.1	0.0	2,778	666.1
14	2,843	681.8	0.0	2,843	681.8
12	7,107	1,704	0.0	7,107	1,704
11	7,149	1,714	0.0	7,149	1,714
15	55,180	13,230	0.0	55,180	13,230
16	NR	NR	0.0	NR	NR
16	NR	NR	0.0	NR	NR
17	NR	NR	0.0	NR	NR
1	NR	NR	NR	NR	NR
2	NR	NR	NR	NR	NR
6	NR	NR	NR	NR	NR
7	NR	NR	NR	NR	NR
8	NR	NR	NR	NR	NR
9	NR	NR	NR	NR	NR
18	NR	NR	NR	NR	NR
Average	6,733	1,615		7,330	1,758

NR - Data not reported

*Nickel forming no longer performed by this plant.

Table V-77

NICKEL-COBALT ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	F-13	1	0.014	ND		
44. methylene chloride	F-13	1	0.002	0.027		
55. naphthalene	D-12	1	ND	ND		
	D-15	1	ND		ND	
	F-13	3	0.001	ND		ND
	F-15	3	0.001		ND	
58. 4-nitrophenol	D-12	1	ND	ND		
	D-15	1	ND		ND	
	F-13	3	ND	0.003	ND	ND
	F-15	3	ND		ND	
65. phenol	D-12	1	ND	0.004		
	D-15	1	ND		0.002	
	F-13	3	ND	0.024		0.012
66. bis(2-ethylhexyl)phthalate	D-12	1	0.009	0.007		
	D-15	1	0.009		ND	
	F-13	3	ND	ND		ND
	F-15	3	ND		ND	
114. antimony	D-12	1	<0.003	<0.003		
	D-15	1	<0.003			<0.003
	F-13	3	<0.002	0.002		<0.002
	F-15	3	0.0002		0.0021	
115. arsenic	D-12	1	<0.003	<0.003		
	D-15	1	<0.003		0.003	
	F-13	3	<0.005	0.0015		<0.005
	F-15	3	<0.005			<0.005
117. beryllium	D-12	1	<0.0005	0.001		
	D-15	1	<0.0005		<0.0005	
	F-13	3	<0.010	<0.010		<0.010
	F-15	3	<0.010		<0.010	
118. cadmium	D-12	1	<0.002	0.002		
	D-15	1	<0.002		<0.008	
	F-13	3	<0.050	<0.050		<0.050
	F-15	3	<0.050			<0.050

Table V-77 (Continued)

NICKEL-COBALT ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
119. chromium (total)	D-12	1	0.040	0.10		
	D-15	1	<0.068		0.17	
	F-13	3	<0.100	<0.100		0.270
	F-15	3	<0.100		<0.100	
120. copper	D-12	1	0.068	0.036		
	D-15	1	0.068		0.023	
	F-13	3	0.170	0.120		1.50
	F-15	3	0.170		0.400	
121. cyanide (total)	F-13	1	<0.02	<0.02		<0.02
	F-15	1	<0.02		<0.02	
122. lead	D-12	1	<0.084	0.16		
	D-15	1	<0.084		<0.084	
	F-13	3	<0.100	<0.100		<0.100
	F-15	3	<0.100			<0.100
123. mercury	D-12	1	<0.0020	<0.0020		
	D-15	1	<0.0002		<0.0002	
	F-13	3	<0.0020	<0.0020		<0.0020
	F-15	3	<0.0020			<0.0020

Table V-77 (Continued)

NICKEL-COBALT ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
124. nickel	D-12	1	<0.003	0.24		
	D-15	1	<0.003		0.050	
	F-13	3	0.200	0.280		5.58
	F-16	3	0.200			1.08
125. selenium	D-12	6	<0.003	<0.003	0.003	
	D-1	1	<0.003		0.003	
	F-13	3	<0.010	<0.010		<0.010
	F-15	3	<0.010		<0.010	
126. silver	D-12	1	<0.001	<0.001		
	D-15	1	<0.001		<0.001	
	F-13	3	<0.002	<0.002		<0.002
	F-15	3	<0.002		<0.002	
127. thallium	D-12	1	<0.003	<0.003		
	D-15	1	<0.003		<0.003	
	F-13	3	<0.005	<0.005		<0.005
	F-15	3	<0.005		<0.005	
128. zinc	D-12	1	0.038	0.071		
	D-15	1	0.038		0.13	
	F-13	3	<0.050	0.050		0.110
	F-15	3	<0.050		0.240	
Nonconventional Pollutants						
Acidity	D-12	1	<1	<1		
	D-15	1	<1		<1	
	F-13	3	<1	<1		<1
	F-15	3	<1		<1	
Alkalinity	D-12	1	180	110		
	D-15	1	180		170	
	F-13	3	61	46		52
	F-15	3	61		1,170	
Aluminum	D-12	1	<0.050	0.052		
	D-15	1	<0.050		<0.050	
	F-13	3	0.910	0.420		0.480
	F-15	3	0.910			0.100

Table V-77 (Continued)

NICKEL-COBALT ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	D-12	<1	<1			
	D-15	1			0.19	
	F-13	3	0.04	0.62		0.03
	F-15	3	0.04		<0.01	
Barium	D-12	1	0.12	0.13	0.15	
	D-15	1	0.12		0.12	
	F-13	3	0.080	0.030		0.070
	F-15	3	0.080		0.040	
Boron	D-12	1	<0.009	0.094		
	D-15	1	<0.009		0.12	
	F-13	3	<0.100	<0.100		0.260
	F-15	3	<0.1002			4.07
Calcium	D-12	1	40			
	D-15	1	63		61	
	F-13	3	46.2	22.7		32.8
	F-15	3	46.2			29.9
Chemical Oxygen Demand	D-12	1	<5	<5		
	D-15	1	<5		<5	
	F-13	3	<1	160		160
	F-15	3	<1		540	
Chloride	D-12	1	34	50		
	D-15	1	34		54	
	F-13	3	12	34		31
	F-15	3	12		32	
Cobalt	D-12	1	<0.006	0.16		
	D-15	1	<0.006		0.021	
	F-13	3	<0.100	<0.100		<0.100
	F-15	3	<0.100			<0.100
Fluoride	D-12	1	0.45	0.61		
	D-15	1	0.45		1.8	
	F-13	3	0.43	1.0		1.0
	F-15	3	0.43		1.2	
Iron	D-12	1	0.066	0.38		
	D-15	1	0.066		0.47	
	F-13	3	1.37	0.980		3.24
	F-15	3	1.37			0.260

Table V-77 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Magnesium	D-12	1	24	30		
	D-15	1	24		23	
	F-13	3	12.7	8.04		11.1
	F-15	3	12.7		8.45	
Manganese	D-12	1	0.012	0.034		
	D-15	1	0.012		0.023	
	F-13	3	0.080	0.030		0.130
	F-15	3	<0.080			0.200
Molybdenum	D-12	1	0.030	0.093		
	D-15	1	0.030		0.098	
	F-13	3	<0.200	<0.200		<0.200
	F-15	3	<0.200		<0.200	
Phenolics	F-13	1	<0.005	<0.005		0.095
	F-6	1	<0.005	0.012	0.012	<0.005
Phosphate	D-12	1	<4	<4		
	D-15	1	<4		<4	
	F-13	3	<4	12		<4
	F-15	3	<4		1,200	
Sodium	D-12	1	9.5	14		
	D-15	1	9.5		13	
	F-13	3	154	27.6		32.8
	F-15	3	154		840	
Sulfate	D-12	1	53	59		
	D-15	1	53		53	
	F-13	3	130	190		110
	F-15	3	130		340	
Tin	D-12	1	<0.12	0.17		
	D-15	1	<0.12		<0.12	
	F-13	3	<0.200			<0.200
	F-15	3	<0.200		<0.200	
Titanium	D-12	1	<0.005	0.11		
	D-15	1	<0.005		0.360	
	F-13	3	<0.020	0.020		0.040
	F-15	3	<0.020		0.090	

Table V-77 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Dissolved Solids (TDS)	D-12	1	393	400		
	D-15	1	393		300	
	F-13	3	320	320		315
	F-15	3	320		2,600	
Total Organic Carbon (TOC)	D-12	1	8	3		
	D-15	1	8		5	
	F-13	3	2	25		34
	F-15	3	2		82	
Total Solids (TS)	D-12	1	395	390		
	D-15	1	395			570
	F-13	3	330	830		460
	F-15	3	330		2,700	
Vanadium	D-12	1	0.016	0.062		
	D-15	1	0.010		0.028	
	F-13	3	<0.010	<0.010		<0.010
	F-15	3	<0.010		0.010	
Yttrium	D-12	1	<0.002	0.008		
	D-15	1	<0.020		0.006	
	F-13	3	<0.020	<0.020		<0.020
	F-15	3	<0.020			<0.020

Table V-77 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	D-12	1	<1	3		
	D-15	1	<1		<1	
	F-13	1	<1	6.5		26
	F-15	1	<1		2	
Total Suspended Solid (TSS)	D-12	1	<1	5		
	D-15	1	<1		190	
	F-13	3	22	8.6		190
	F-15	3	22		61	
pH (standard units)	D-12	1	7.14	8.14		
	D-15	1	7.14		7.00	
	F-13	3	6.64	7.48		6.65
	F-15	3	6.64		9.02	13

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

2. Note that stream code Y-6 also appears on the titanium molten salt rinsewater raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

Table V-78

NICKEL-COBALT MOLTEN SALT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	33.40	8.01	P	33.40	8.01
2	198.1	47.50	P	198.1	47.50
3	513.2	123.1	0.0	513.2	123.1
4	1,465	351.2	0.0	1,465	351.2
5	2,535	607.8	0.0	2,535	607.8
4	6,379	1,530	0.0	6,379	1,530
4	23,620	5,664	0.0	23,620	5,664
6	16,120	3,865	0.0	16,120	3,865
Average	6,358	1,525		6,358	1,525

P - Periodic discharge

Table V-79

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	D-9	6	<0.003	<0.003	<0.003	<0.003
	E-5	1	<0.005			0.050
	F-6	3	<0.002	<0.002	0.002	<0.002
115. arsenic	D-9	6	<0.003	<0.003	<0.003	<0.003
	E-5	6	<0.005			0.260
	F-6	3	<0.005	<0.005	<0.005	<0.005
117. beryllium	D-9	6	<0.0005	0.001	0.001	0.001
	E-5	1	<0.010			<0.010
	F-6	3	<0.010	<0.010	<0.010	<0.010
118. cadmium	D-9	6	<0.002	0.14	0.075	0.22
	E-5	1	<0.050			<0.050
	F-6	3	<0.050	<0.050	<0.050	<0.050
119. chromium (total)	D-9	6	0.042	49	66	36
	E-5	1	<0.100			1,100
	F-6	3	<0.100	11.9	10.4	36.3
120. copper	D-9	6	0.068	0.35	0.26	0.32
	E-5	1	0.080			8.05
	F-6	3	0.170	0.650	0.080	0.220
121. cyanide (total)	E-5	1	<0.02			<0.02
	F-6	1	<0.02	<0.02	<0.02	<0.02
122. lead	D-9	6	<0.084	<0.084	0.089	<0.084
	E-5	1	<0.100			<0.100
	F-6	3	<0.100	<0.100	<0.100	<0.100
123. mercury	D-9	6	<0.0002	<0.0002	<0.0002	<0.0002
	E-5	1	<0.0010			<0.0010
	F-6	3	<0.0020	<0.0020	<0.0020	<0.0020

Table V-79 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
124. nickel	D-9	6	<0.003	10	5.3	14
	E-5	1	<0.100			<0.100
	F-6	3	0.200	0.500	0.380	1.64
125. selenium	D-9	6	<0.003	<0.003	<0.003	<0.003
	E-5	1	<0.010			0.090
	F-6	3	<0.010	<0.010	0.012	<0.010
126. silver	D-9	6	<0.001	0.008	0.010	0.005
	E-5	1	<0.002			<0.002
	F-6	3	<0.002	<0.002	<0.002	<0.002
127. thallium	D-9	6	<0.003	0.013	0.006	0.004
	E-5	1	<0.002			0.019
	F-6	3	<0.005	<0.005	<0.005	<0.005
128. zinc	D-9	6	0.038	0.26	0.40	0.21
	E-5	1	<0.050			0.390
	F-6	3	<0.050	0.050	<0.050	0.020
Nonconventional Pollutants						
Acidity	D-9	6	<1	<1	<1	<1
	E-5	1	<1			<1
	F-6	3	<1	<1	<1	<1
Alkalinity	D-9	6	180	1,600	1,980	1,140
	E-5	1	83			170,000
	F-6	3	61	550	740	1,340
Aluminum	D-9	6	<0.050	0.37	0.37	0.30
	E-5	1	0.300			5.90
	F-6	3	0.910	0.420	0.220	0.300

Table V-79 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	D-9	6	<1	0.44	0.52	0.63
	E-5	1	0.22			5.2
	F-6	3	0.04	<0.01	0.05	<0.01
Barium	D-9	6	0.12	0.21	0.12	0.15
	E-5	1	0.060			0.780
	F-6	3	0.080	0.040	0.030	0.030
Boron	D-9	6	<0.009	<0.009	<0.009	<0.009
	E-5	1	0.170			340
	F-6	3	<0.100	<0.100	<0.100	0.210
Calcium	D-9	6	63	1,000	830	810
	E-5	1	33.0			1.60
	F-6	3	46.2	18.2	14.2	9.63
Chemical Oxygen Demand	D-9	6	<5	100	133	56
	E-5	1	34			650
	F-6	3	<1	<1	21	5
Chloride	D-9	6	34	360	390	280
	E-5	1	26			14,000
	F-6	3	12	74	92	130
Cobalt	D-9	6	<0.006	2.5	0.72	2.8
	E-5	1	<0.100			0.400
	F-6	3	<0.100	<0.100	<0.100	<0.100
Fluoride	D-9	6	0.45	1.1	0.49	740
	E-5	1	0.44			65
	F-6	3	0.43	0.66	5.5	61
Iron	D-9	6	0.066	6.1	3.6	8.2
	E-5	1	1.00			0.220
	F-6	3	1.37	0.590	0.430	0.010

Table V-79 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Magnesium	D-9	6	24	18	13	12
	E-5	1	15.8			<0.100
	F-6	3	12.7	4.20	3.01	1.19
Manganese	D-9	6	0.012	1.2	1.1	0.99
	E-5	1	0.140			<0.010
	F-6	3	0.080	0.100	0.050	0.230
Molybdenum	D-9	6	0.030	23	25	16
	E-5	1	<0.200			15.5
	F-6	3	<0.200	<0.200	0.260	0.380
Phenolics	E-5	1	0.014			0.053
	F-6	1	<0.005	0.012	0.012	<0.005
Phosphate	D-9	6	<4	14	<4	<4
	E-5	1	16			<4
	F-6	3	<4	<4	<4	<4
Sodium	D-9	6	9.5	1,400	1,700	1,000
	E-5	1	33.0			9,400
	F-6	3	154.0	380	380	880
Sulfate	D-9	6	53	3,700	3,800	2,900
	E-5	1	170			3,800
	F-6	3	130	100	98	120
Tin	D-9	6	<0.12	3.1	1.9	2.7
	E-5	1	<0.200			<0.200
	F-6	3	<0.200	<0.200	<0.200	<0.200

Table V-79 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	D-9	6	<0.005	2.0	0.61	1.6
	E-5	1	<0.020			0.360
	F-6	3	<0.020	0.040	0.020	0.070
Total Dissolved Solids (TDS)	D-9	6	393	7,700	8,350	6,000
	E-5	1	330			230,000
	F-6	3	320	1,100	1,100	2,700
Total Organic Carbon (TOC)	D-9	6	8	42	42	29
	E-5	1	<1			7.2
	F-6	3	2	2.0	<1	<1
Total Solids (TS)	D-9	6	395	9,000	10,000	7,100
	E-5	1	380			230,000
	F-6	3	330	1,200	1,020	2,800
Vanadium	D-9	6	0.016	0.46	0.59	0.36
	E-5	1	<0.010			1.88
	F-6	3	<0.010	0.020	0.030	0.050
Yttrium	D-9	6	<0.002	0.010	0.011	<0.002
	E-5	1	<0.020			<0.020
	F-6	3	<0.020	<0.020	<0.020	<0.020
Conventional Pollutants						
Oil and Grease	D-9	1	<1	38	4	<1
	E-5	1	<1			<1
	F-6	1	<1	7.0	3	<1
Total Suspended Solids (TSS)	D-9	6	<1	790	770	550
	E-5	1	29			4,200
	F-6	3	22	80	39	21
pH (standard units)	D-9	6	7.14	10.40	11.80	11.50
	E-5	1	6.71			12.84
	F-6	3	6.64	10.19	10.70	11.60

Table V-79 (Continued)

NICKEL-COBALT MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

2. Note that stream code Y-6 also appears on the titanium molten salt rinsewater raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

Table V-80

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use** L/kkg	Water Use** gal/ton	Percent Recycle	Wastewater Discharge*** L/kkg	Wastewater Discharge*** gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	100	0.00	0.00
3*	NR	NR	NR	0.00	0.00
4	38.37	9.20	100	0.00	0.00
5	39.53	9.48	100	0.00	0.00
5	164.2	39.38	100	0.00	0.00
6	1,960	470	99.9	0.00	0.00
7	2,480	594	100	0.00	0.00
8	476,600	114,300	100	0.00	0.00
9	500,400	120,000	NR	4.29	1.03
10	NR	NR	NR	11.60	2.78
9	NR	NR	NR	16.26	3.90
9	0.00	0.00	<99.9	67.25	16.13
11	97.64	23.42	0.0	97.64	23.42
12	NR	NR	NR	NR	NR
13	NR	NR	NR	NR	NR
14	NR	NR	NR	NR	NR
15	NR	NR	NR	NR	NR
16	NR	NR	NR	NR	NR
17	NR	NR	NR	NR	NR
18	NR	NR	NR	NR	NR
19	NR	NR	100	NR	NR
20	NR	NR	NR	NR	NR
17	NR	NR	NR	NR	NR
21	NR	NR	NR	NR	NR
Average	122,700	29,430		39.41	9.45

NR - Data not reported

*Nickel forming no longer performed at this plant.
**Application rate.
***Volume of spent lubricant generated per mass of nickel-cobalt.

Table V-81

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
1. acenaphthene	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		1.450	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
4. benzene	D-5	1	ND		ND	
	D-16	1	ND	0.026		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	0.003		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
11. 1,1,1-trichloroethane	D-5	1	0.009		0.019	
	D-16	1	0.009	0.001		
	D-17	1	0.009		0.029	
	D-18	1	0.009		0.030	
	F-20	1	0.014		ND	
	F-22	1	0.014	0.034		
	F-23	1	0.014	0.012		
	F-24	1	0.014	ND		
	F-25	1	0.014	ND		
	F-26	1	0.014		ND	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
13. 1,1-dichloroethane	D-5	1	ND		0.007	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	0.015		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
22. p-chloro-m-cresol	D-5	1	ND		ND	
	D-16	1	ND	0.116		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
23. chloroform	D-5	1	0.144		ND	
	D-16	1	0.144	ND		
	D-17	1	0.144		ND	
	D-18	1	0.144		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
34. 2,4-dimethylphenol	D-5	1	ND		ND	
	D-16	1	ND	0.168		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	0.105		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
37. 1,2-diphenylhydrazine	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	0.009		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
39. fluoranthene	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		3.850	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
44. methylene chloride	D-5	1	0.002		0.001	
	D-16	1	0.002	0.017		
	D-17	1	0.002		ND	
	D-18	1	0.002		ND	
	F-20	1	0.002		1.110	
	F-22	1	0.002	0.006		
	F-23	1	0.002	0.003		
	F-24	1	0.002	1.210		
	F-25	1	0.002	0.133		
	F-26	1	0.002		0.039	
55. naphthalene	D-5	1	ND		ND	
	D-16	1	ND	0.027		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	0.001		ND	
	F-22	1	0.001	ND		
	F-23	1	0.001	ND		
	F-24	1	0.001	ND		
	F-25	1	0.001	1.240		
	F-26	1	0.001		ND	
57. 2-nitrophenol	D-5	1	ND		ND	
	D-16	1	ND	0.105		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
58. 4-nitrophenol	D-5	1	ND		ND	
	D-16	1	ND	0.446		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
60. 4,6 dinitro-o-cresol	D-5	1	ND		ND	
	D-16	1	ND	0.593		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
64. pentachlorophenol	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		1.950	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	145		
	F-26	1	ND		ND	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
65. phenol	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		0.547	
	D-18	1	ND		ND	
	F-20	1	ND		0.090	
	F-22	1	ND	ND		
	F-23	1	ND	0.195		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
66. bis(2-ethylhexyl) phthalate	D-5	1	0.009		0.010	
	D-16	1	0.009	ND		
	D-17	1	0.009		ND	
	D-18	1	0.009		ND	
	F-20	1	ND		0.015	
	F-22	1	ND	ND		
	F-23	1	ND	0.007		
	F-24	1	ND	ND		
	F-25	1	ND	0.381		
	F-26	1	ND		ND	
68. di-n-butyl phthalate	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	0.004		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
69. di-n-octyl phthalate	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		0.001	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
77. acenaphthylene	D-5	1	ND		ND	
	D-16	1	ND	0.007		
	D-17	1	ND		ND	
	D-18	1	ND		ND	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
80. fluorene	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		1.730	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	
81. phenanthrene	D-5	1	ND		ND	
	D-16	1	ND	0.002		
	D-17	1	ND		0.804	
	D-18	1	ND		7.420	
	F-20	1	ND		0.286	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	8.550		
	F-25	1	ND	0.354		
	F-26	1	ND		ND	
84. pyrene	D-5	1	ND		ND	
	D-16	1	ND	ND		
	D-17	1	ND		ND	
	D-18	1	ND		1.800	
	F-20	1	ND		ND	
	F-22	1	ND	ND		
	F-23	1	ND	ND		
	F-24	1	ND	ND		
	F-25	1	ND	ND		
	F-26	1	ND		ND	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
114. antimony	D-5	1	<0.003		<0.003	
	D-16	1	<0.003	<0.003		
	D-17	1	<0.003		<0.003	
	D-18	1	<0.003		<0.003	
	F-20	1	<0.002		<0.002	
	F-22	1	<0.002	0.002		
	F-23	1	<0.002	0.003		
	F-24	1	<0.002	0.006		
	F-25	1	<0.002	0.004		
	F-26	1	<0.002		0.003	
	Y-7	1	0.0002			0.0625
	Y-8	1	0.0002			0.0022
115. arsenic	D-5	1	<0.003		<0.003	
	D-16	1	<0.003	<0.003		
	D-17	1	<0.003		<0.003	
	D-18	1	<0.003		<0.003	
	F-20	1	<0.005		0.007	
	F-22	1	<0.005	0.012		
	F-23	1	<0.005	0.023		
	F-24	1	<0.005	0.017		
	F-25	1	<0.005	0.008		
	F-26	1	<0.005		<0.005	
	Y-7	1	0.002			0.26
	Y-8	1	0.002			0.024
117. beryllium	D-5	1	<0.0005		<0.0005	
	D-16	1	<0.0005	<0.0005		
	D-17	1	<0.0005		<0.0005	
	D-18	1	<0.0005		0.001	
	F-20	1	<0.010		<0.010	
	F-22	1	<0.010	<0.010		
	F-23	1	<0.010	<0.010		
	F-24	1	<0.010	<0.010		
	F-25	1	<0.010	<0.010		
	F-26	1	<0.010		<0.010	
	Y-7	1	<0.02			<0.02
	Y-8	1	<0.02			<0.02

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
118. cadmium	D-5	1	<0.002		0.010	
	D-16	1	<0.002	0.066		
	D-17	1	<0.002		0.035	
	D-18	1	<0.002		0.072	
	F-20	1	<0.050		<0.050	
	F-22	1	<0.050	<0.050		
	F-23	1	<0.050	<0.050		
	F-24	1	<0.050	<0.050		
	F-25	1	<0.050	<0.050		
	F-26	1	<0.050		<0.050	
	Y-7	1	<0.03			<0.03
	Y-8	1	<0.03			<0.03
119. chromium (total)	D-5	1	0.042		0.19	
	D-16	1	0.042	2.5		
	D-17	1	0.042		1.9	
	D-18	1	0.042		1.2	
	F-20	1	<0.100		<0.100	
	F-22	1	<0.100	<0.100		
	F-23	1	<0.100	24.0		
	F-24	1	<0.100	11.2		
	F-25	1	<0.100	<0.100		
	F-26	1	<0.100		0.670	
	Y-7	1	<0.02			0.7
	Y-8	1	<0.02			0.2
120. copper	D-5	1	0.068		0.10	
	D-16	1	0.068	0.28		
	D-17	1	0.068		0.26	
	D-18	1	0.068		0.76	
	F-20	1	0.170		0.790	
	F-22	1	0.170	0.120		
	F-23	1	0.170	1.20		
	F-24	1	0.170	16.5		
	F-25	1	0.170	1.42		
	F-26	1	0.170		0.390	
	Y-7	1	<0.02			0.5
	Y-8	1	<0.02			0.4

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
121. cyanide (total)	F-20	1	<0.02		<0.02	
	F-22	1	<0.02	<0.02		
	F-23	1	<0.02	<0.02		
	F-24	1	<0.02	<0.02		
	F-25	1	<0.02	<0.02		
	F-26	1	<0.02		<0.02	
	Y-7	1	0.03			31
	Y-8	1	0.03			<0.02
122. lead	D-5	1	<0.084		<0.084	
	D-16	1	<0.084	<0.084		
	D-17	1	<0.084		<0.084	
	D-18	1	<0.084		<0.084	
	F-20	1	<0.100		<0.100	
	F-22	1	<0.100	<0.100		
	F-23	1	<0.100	1.00		
	F-24	1	<0.100	0.250		
	F-25	1	<0.100	0.240		
	F-26	1	<0.100		<0.100	
	Y-7	1	0.067			0.25
	Y-8	1	0.067			0.13
123. mercury	D-5	1	<0.0002		<0.002	
	D-16	1	<0.0002	<0.0002		
	D-17	1	<0.0002		<0.0002	
	D-18	1	<0.0002		<0.0002	
	F-20	1	<0.0020		<0.0020	
	F-22	1	<0.0020	<0.0020		
	F-23	1	<0.0020	<0.0020		
	F-24	1	<0.0020	<0.0020		
	F-25	1	<0.0020	<0.0020		
	F-26	1	<0.0020		<0.0020	
	Y-7	1	<0.005			<0.005
	Y-8	1	<0.005			<0.005

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
124. nickel	D-5	1	<0.003		1.4	
	D-16	1	<0.003	4.8		
	D-17	1	<0.003		2.8	
	D-18	1	<0.003		4.0	
	F-20	1	0.200		4.10	
	F-22	1	0.200	0.100		
	F-23	1	0.200	116		
	F-24	1	0.200	26.0		
	F-25	1	0.200	2.54		
	F-26	1	0.200		0.870	
	Y-7	1	0.1			66.0
	Y-8	1	0.1			3.7
125. selenium	D-5	1	<0.003		<0.003	
	D-16	1	<0.003	<0.003		
	D-17	1	<0.003		<0.003	
	D-18	1	<0.003		<0.003	
	F-20	1	<0.010		<0.010	
	F-22	1	<0.010	<0.010		
	F-23	1	<0.010	<0.010		
	F-24	1	<0.010	<0.010		
	F-25	1	<0.010	<0.010		
	F-26	1	<0.010		<0.010	
	Y-7	1	<0.001			0.7
	Y-8	1	<0.001			0.002
126. silver	D-5	1	<0.001		<0.001	
	D-16	1	<0.001	<0.001		
	D-17	1	<0.001		<0.001	
	D-18	1	<0.001		<0.001	
	F-20	1	<0.002		<0.002	
	F-22	1	<0.002	<0.002		
	F-23	1	<0.002	<0.002		
	F-24	1	<0.002	0.003		
	F-25	1	<0.002	<0.002		
	F-26	1	<0.002		0.005	
	Y-7	1	<0.0005			0.0053
	Y-8	1	<0.0005			<0.0005

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
127. thallium	D-5	1	<0.003		0.007	
	D-16	1	<0.003	<0.003		
	D-17	1	<0.003		<0.003	
	D-18	1	<0.003		0.006	
	F-20	1	<0.005		<0.005	
	F-22	1	<0.005	<0.005		
	F-23	1	<0.005	<0.005		
	F-24	1	<0.005	<0.005		
	F-25	1	<0.005	<0.005		
	F-26	1	<0.005		<0.005	
	Y-7	1	<0.001			0.002
	Y-8	1	<0.001			0.002
128 zinc	D-5	1	0.038		0.32	
	D-16	1	0.038	0.12		
	D-17	1	0.038		0.42	
	D-18	1	0.038		0.87	
	F-20	1	<0.050		0.280	
	F-22	1	<0.050	<0.050		
	F-23	1	<0.050	0.730		
	F-24	1	<0.050	0.900		
	F-25	1	<0.050	0.970		
	F-26	1	<0.050		0.590	
	Y-7	1	0.08			0.06
	Y-8	1	0.08			0.43
Nonconventional Pollutants						
Acidity	D-5	1	<1		<1	
	D-16	1	<1	<1		
	D-17	1	<1		<1	
	D-18	1	<1		<1	
	F-20	1	<1		<1	
	F-22	1	<1	<1		
	F-23	1	<1	<1		
	F-24	1	<1	<1		
	F-25	1	<1	<1		
	F-26	1	<1		<1	
	Y-7	1	11.0			200.0
	Y-8	1	11.0			230.0

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Alkalinity	D-5	1	180		1,870	
	D-16	1	180	550		
	D-17	1	180		930	
	D-18	1	180		940	
	F-20	1	61		360	
	F-22	1	61	6,700		
	F-23	1	61	37		
	F-24	1	61	810		
	F-25	1	61	300		
	F-26	1	61		510	
	Y-7	1	31.0			860.0
	Y-8	1	31.0			370.0
Aluminum	D-5	1	<0.050		0.19	
	D-16	1	<0.050	7.2		
	D-17	1	<0.050		1.6	
	D-18	1	<0.050		19	
	F-20	1	0.910		0.760	
	F-22	1	0.910	0.150		
	F-23	1	0.910	12.4		
	F-24	1	0.910	2.53		
	F-25	1	0.910	0.260		
	F-26	1	0.910		0.740	
	Y-7	1	0.03			12.0
	Y-8	1	0.03			1.5

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	D-5	1	<1		7.8	
	D-16	1	<1	5		
	D-17	1	<1		0.40	
	D-18	1	<1		0.91	
	F-20	1	0.04		<0.01	
	F-22	1	0.04	0.25		
	F-23	1	0.04	27		
	F-24	1	0.04	1.44		
	F-25	1	0.04	0.10		
	F-26	1	0.04		<0.01	
Barium	D-5	1	0.12		0.028	
	D-16	1	0.12	0.020		
	D-17	1	0.12		0.006	
	D-18	1	0.12		0.33	
	F-20	1	0.080		<0.010	
	F-22	1	0.080	0.020		
	F-23	1	0.080	0.030		
	F-24	1	0.080	0.110		
	F-25	1	0.080	0.050		
	F-26	1	0.080		0.090	
	Y-7	1	<0.02			0.04
	Y-8	1	<0.02			<0.02
Boron	D-5	1	<0.009		0.023	
	D-16	1	<0.009	0.31		
	D-17	1	<0.009		0.73	
	D-18	1	<0.009		0.19	
	F-20	1	<0.100		0.130	
	F-22	1	<0.100	0.570		
	F-23	1	<0.100	5.74		
	F-24	1	<0.100	1.26		
	F-25	1	<0.100	0.270		
	F-26	1	<0.100		0.760	
	Y-7	1	2.2			9.1
	Y-8	1	2.2			9.9

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Calcium	D-5	1	63		42	
	D-16	1	63	51		
	D-17	1	63		38	
	D-18	1	63		85	
	F-20	1	46.2		5.26	
	F-22	1	46.2	1.14		
	F-23	1	46.2	2.43		
	F-24	1	46.2	5.33		
	F-25	1	46.2	35.2		
	F-26	1	46.2		37.0	
	Y-7	1	12.0			7.7
	Y-8	1	12.0			17.0
Chemical Oxygen Demand (COD)	D-5	1	<5		5,240	
	D-16	1	<5	1,280		
	D-17	1	<5		9,150	
	D-18	1	<5		3,230	
	F-20	1	<1		34,000	
	F-22	1	<1	290		
	F-23	1	<1	340		
	F-24	1	<1	230,000		
	F-25	1	<1	2,800		
	F-26	1	<1		17,000	
Chloride	D-5	1	34		52	
	D-16	1	34	54		
	D-17	1	34		190	
	D-18	1	34		160	
	F-20	1	12		95	
	F-22	1	12	42		
	F-23	1	12	140		
	F-24	1	12	740		
	F-25	1	12	58		
	F-26	1	12		47	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Cobalt	D-5	1	<0.006		0.049	
	D-16	1	<0.006	0.067		
	D-17	1	<0.006		0.19	
	D-18	1	<0.006		3.3	
	F-20	1	<0.100		<0.100	
	F-22	1	<0.100	<0.100		
	F-23	1	<0.100	1.72		
	F-24	1	<0.100	<0.100		
	F-25	1	<0.100	0.140		
	F-26	1	<0.100		0.740	
	Y-7	1	<0.03			3.4
	Y-8	1	<0.03			0.3
Fluoride	D-5	1	0.45		0.47	
	D-16	1	0.45	110		
	D-17	1	0.45		1.7	
	D-18	1	0.45		2.2	
	F-20	1	0.43		1.2	
	F-22	1	0.43	0.42		
	F-23	1	0.43	720		
	F-24	1	0.43	220		
	F-25	1	0.43	2.7		
	F-26	1	0.43		2.0	
	Y-7	1	290.0			100.0
	Y-8	1	290.0			10.0

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	D-5	1	0.066		30	
	D-16	1	0.066	11		
	D-17	1	0.066		1.9	
	D-18	1	0.066		1.2	
	F-20	1	1.37		1.66	
	F-22	1	1.37	2.12		
	F-23	1	1.37	47.3		
	F-24	1	1.37	8.46		
	F-25	1	1.37	2.20		
	F-26	1	1.37		94.2	
	Y-7	1	0.061			11.0
	Y-8	1	0.061			5.4
Magnesium	D-5	1	24		21	
	D-16	1	24	26		
	D-17	1	24		64	
	D-18	1	24		22	
	F-20	1	12.7		2.07	
	F-22	1	12.7	2.53		
	F-23	1	12.7	7.05		
	F-24	1	12.7	16.1		
	F-25	1	12.7	11.8		
	F-26	1	12.7		11.8	
	Y-7	1	1.8			6.5
	Y-8	1	1.8			7.9
Manganese	D-5	1	0.012		0.52	
	D-16	1	0.012	0.28		
	D-17	1	0.012		0.43	
	D-18	1	0.012		0.93	
	F-20	1	0.080		0.200	
	F-22	1	0.080	0.080		
	F-23	1	0.080	4.10		
	F-24	1	0.080	0.990		
	F-25	1	0.080	0.400		
	F-26	1	0.080		1.25	
	Y-7	1	<0.01			0.36
	Y-8	1	<0.01			0.38

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Molybdenum	D-5	1	0.030		0.95	
	D-16	1	0.030	13		
	D-17	1	0.030		22	
	D-18	1	0.030		30	
	F-20	1	<0.200		<0.200	
	F-22	1	<0.200	0.360		
	F-23	1	<0.200	5.40		
	F-24	1	<0.200	10.0		
	F-25	1	<0.200	0.680		
	F-26	1	<0.200		2.32	
	Y-7	1	0.056			6.2
	Y-8	1	0.056			52.0
Phenolics	F-20	1	<0.005		0.14	
	F-22	1	<0.005	0.009		
	F-23	1	<0.005	0.83		
	F-24	1	<0.005	1.42		
	F-25	1	<0.005	0.11		
	F-26	1	<0.005		0.023	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phosphate	D-5	1	<4		<4	
	D-16	1	<4	<4		
	D-17	1	<4		<4	
	D-18	1	<4		<4	
	F-20	1	<4		<4	
	F-22	1	<4	<4		
	F-23	1	<4	10		
	F-24	1	<4	<4		
	F-25	1	<4	<4		
	F-26	1	<4		<4	
Sodium	D-5	1	9.5		1,200	
	D-16	1	9.5	290		
	D-17	1	9.5		510	
	D-18	1	9.5		540	
	F-20	1	154		12.6	
	F-22	1	154	3,050		
	F-23	1	154	16.5		
	F-24	1	154	328		
	F-25	1	154	130		
	F-26	1	154		154	
	Y-7	1	14.0			7,000.0
	Y-8	1	14.0			360.0
Sulfate	D-5	1	53		58	
	D-16	1	53	95		
	D-17	1	53		360	
	D-18	1	53		370	
	F-20	1	130		160	
	F-22	1	130	66		
	F-23	1	130	140		
	F-24	1	130	6,400		
	F-25	1	130	150		
	F-26	1	130		490	

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Tin	D-5	1	<0.12		<0.12	
	D-16	1	<0.12	0.30		
	D-17	1	<0.12		1.1	
	D-18	1	<0.12		2.0	
	F-20	1	<0.200		<0.200	
	F-22	1	<0.200	<0.200		
	F-23	1	<0.200	<0.200		
	F-24	1	<0.200	<0.200		
	F-25	1	<0.200	<0.200		
	F-26	1	<0.200		<0.200	
	Y-7	1	<1.0			<1.0
	Y-8	1	<1.0			<1.0
Titanium	D-5	1	<0.005		0.60	
	D-16	1	<0.005	0.81		
	D-17	1	<0.005		0.13	
	D-18	1	<0.005		0.068	
	F-20	1	<0.020		<0.020	
	F-22	1	<0.020	<0.020		
	F-23	1	<0.020	<0.020		
	F-24	1	<0.020	0.120		
	F-25	1	<0.020	0.030		
	F-26	1	<0.020		<0.020	
	Y-7	1	0.5			72.0
	Y-8	1	0.5			1.6
Total Dissolved Solids (TDS)	D-5	1	393		3,900	
	D-16	1	393	1,500		
	D-17	1	393		2,186	
	D-18	1	393		8,700	
	F-20	1	320		4,600	
	F-22	1	320	8,200		
	F-23	1	320	1,220		
	F-24	1	320	40,500		
	F-25	1	320	1,400		
	F-26	1	320		5,800	
	Y-7	1	120.0			490.0
	Y-8	1	120.0			2,100.0

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Organic Carbon (TOC)	D-5	1	8		1,670	
	D-16	1	8	480		
	D-17	1	8		6,500	
	D-18	1	8		990	
	F-20	1	2		5,600	
	F-22	1	2	38		
	F-23	1	2	17		
	F-24	1	2	41,000		
	F-25	1	2	280		
	F-26	1	2		4,700	
Total Solids (TS)	D-5	1	395		7,300	
	D-16	1	395	2,400		
	D-17	1	395		5,700	
	D-18	1	395		12,000	
	F-20	1	330		12,000	
	F-22	1	330	8,400		
	F-23	1	330	2,600		
	F-24	1	330	40,000		
	F-25	1	330	3,800		
	F-26	1	330		9,400	
	Y-7	1	120.0			1,400.0
	Y-8	1	120.0			3,400.0
Vanadium	D-5	1	0.016		0.13	
	D-16	1	0.016	0.060		
	D-17	1	0.016		0.025	
	D-18	1	0.016		0.033	
	F-20	1	<0.010		0.020	
	F-22	1	<0.010	<0.010		
	F-23	1	<0.010	<0.010		
	F-24	1	<0.010	<0.010		
	F-25	1	<0.010	<0.010		
	F-26	1	<0.010		0.370	
	Y-7	1	<0.1			11.0
	Y-8	1	<0.1			5.1

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	D-5	1	<0.002		<0.002	
	D-16	1	<0.002	<0.002		
	D-17	1	<0.002		<0.002	
	D-18	1	<0.002		<0.002	
	F-20	1	<0.020		<0.020	
	F-22	1	<0.020	<0.020		
	F-23	1	<0.020	<0.020		
	F-24	1	<0.020	<0.020		
	F-25	1	<0.020	<0.020		
	F-26	1	<0.020		<0.020	
	Y-7	1	<0.1			<0.1
	Y-8	1	<0.1			<0.1
Conventional Pollutants						
Oil and Grease	D-5	1	<1		12	
	D-16	1	<1	3		
	D-17	1	<1		1,500	
	D-18	1	<1		16,000	
	F-20	1	<1		160	
	F-22	1	<1	120		
	F-23	1	<1	7.5		
	F-24	1	<1	660		
	F-25	1	<1	3,200		
	F-26	1	<1		800	
	Y-7	1	1.0			250.0
	Y-8	1	1.0			12,000.0
Total Suspended Solids (TSS)	D-5	1	<1		820	
	D-16	1	<1	46		
	D-17	1	<1		2,180	
	D-18	1	<1		1,070	
	F-20	1	22		390	
	F-22	1	22	100		
	F-23	1	22	1,900		
	F-24	1	22	2,440		
	F-25	1	22	440		
	F-26	1	22		300	
	Y-7	1	54.0			360.0
	Y-8	1	54.0			1,100.0

Table V-81 (Continued)

NICKEL-COBALT SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)						
pH (standard units)	D-5	1	7.14		8.63	
	D-16	1	7.14	8.04		
	D-17	1	7.14		8.31	
	D-18	1	7.14		8.54	
	F-20	1	6.64		7.23	
	F-22	1	6.64	10.33		
	F-23	1	6.64	6.42		
	F-24	1	6.64	7.64		
	F-25	1	6.64	7.20		
	F-26	1	6.64		8.19	
	Y-7	1	6			8
	Y-8	1	6			7

1. The following toxic pollutants were not detected in this waste stream: 2, 3, 5-10, 12, 14-21, 24-33, 35, 36, 38, 40-43, 45-54, 56, 59, 61-63, 67, 70-76, 78, 79, 82, 83, and 85-88.

2. Note that stream codes Y-7 and Y-8 also appear on the titanium sawing or grinding spent emulsions and synthetic coolants raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

3. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-82

NICKEL-COBALT SAWING OR GRINDING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	>0.0	1,814	434.9
Average	NR	NR		1,814	434.9

NR - Data not reported

Table V-83

NICKEL-COBALT STEAM CLEANING CONDENSATE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1*	30.11	7.22	0.0	30.11	7.22
2	NR	NR	0.0	NR	NR
Average	30.11	7.22		30.11	7.22

NR - Data not reported

*Nickel forming no longer performed at this plant.

Table V-84

NICKEL-COBALT HYDROSTATIC TUBE TESTING AND ULTRASONIC TESTING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1*	1,355	324.9	0.0	1,355	324.9
2	NR	NR	NR	NR	NR
Average	1,355	324.9		1,355	324.9

NR - Data not reported

*Nickel forming no longer performed at this plant.

Table V-85

NICKEL-COBALT DYE PENETRANT TESTING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	40	9.5	0.0	40	9.5
2	385	92.2	0.0	385	92.2
3	NR	NR	NR	NR	NR
4	NR	NR	0.0	NR	NR
3	NR	NR	0.0	NR	NR
3	NR	NR	NR	NR	NR
Average	213	50.9		213	50.9

NR - Data not reported

Table V-86

NICKEL-COBALT DYE PENETRANT TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	BK-1		-	<0.100		
118. cadmium	BK-1		-	<0.500		
119. chromium (total)	BK-1		-	<0.300		
120. copper	BK-1		-	<0.200		
122. lead	BK-1		-	<5.000		
124. nickel	BK-1		-	<1.200		
128. zinc	BK-1		-	<0.200		
Nonconventional Pollutants						
Aluminum	BK-1		-	<1.2		
Barium	BK-1		-	<0.100		
Boron	BK-1		-	1.8		
Calcium	BK-1		-	3.6		
Cobalt	BK-1		-	<0.400		
Iron	BK-1		-	1.400		
Magnesium	BK-1		-	0.300		
Manganese	BK-1		-	0.120		
Molybdenum	BK-1		-	<2.000		
Sodium	BK-1		-	8.600		
Tin	BK-1		-	1.700		
Titanium	BK-1		-	<1.000		

Table V-86 (Continued)

NICKEL-COBALT DYE PENETRANT TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	BK-1		-	<0.200		
Yttrium	BK-1		-	<1.000		

1. No analyses were performed on the following toxic pollutants: 1-116, 121, 123, 125-127 and 129.

Table V-87

NICKEL-COBALT WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	96.0	0.00	0.00
2	26.9	112	<100	0.00	0.00
3	8.30	1.99	0.0	8.30	1.99
4	25.59	6.14	0.0	25.59	6.14
5	NR	NR	100	25.66	6.15
6	NR	NR	NR	124.5	29.85
7	571.0	137.0	25.0	428.0	102.6
8	488.2	117.1	0.0	488.2	117.1
9	46,940	11,260	98.0	938.7	225.1
10	NR	NR	92.0	NR	NR
11	NR	NR	100	NR	NR
12	NR	NR	>0.00	NR	NR
13	NR	NR	NR	NR	NR
Average	8,010	1,939		291.3	69.85

NR - Data not reported

*Discharge to surface waters.

Table V-88

NICKEL-COBALT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	D-11	1	<0.003	<0.003		
	F-21	3	<0.002		0.003	
115. arsenic	D-11	1	<0.003	<0.003		
	F-21	3	<0.005		0.003	
117. beryllium	D-11	1	<0.0005	<0.0005		
	F-21	3	<0.010		<0.020	
118. cadmium	D-11	1	<0.002	0.011		
	F-21	3	<0.050		<0.020	
119. chromium (total)	D-11	1	0.042	0.14		
	F-21	3	<0.100		1.75	
120. copper	D-11	1	0.068	<0.001		
	F-21	3	0.170		2.85	
121. cyanide (total)	F-21	1	<0.02		<0.02	
122. lead	D-11	1	<0.084	<0.084		
	F-21	3	<0.100		<0.200	
123. mercury	D-11	1	<0.0002	<0.0002		
	F-21	3	<0.0020		<0.0020	
124. nickel	D-11	1	<0.003	0.86		
	F-21	3	0.200		20.0	
125. selenium	D-11	1	<0.003	<0.003		
	F-21	3	<0.010		<0.010	

Table V-88 (Continued)

NICKEL-COBALT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	D-11	1	<0.001	<0.001		
	F-21	3	<0.002		<0.002	
127. thallium	D-11	1	<0.003	<0.003		
	F-21	3	<0.005		<0.002	
128. zinc	D-11	1	0.038	0.18		
	F-21	3	<0.050		0.060	
Nonconventional Pollutants						
Acidity	D-11	1	<1	120		
	F-21	3	<1		<1	
Alkalinity	D-11	1	180	<1		
	F-21	3	61		47	
Aluminum	D-11	1	<0.050	5.8		
Ammonia Nitrogen	D-11	1	<1	<1		
	F-21	3	0.04		0.39	
Barium	D-11	1	0.12	0.22		
Boron	D-11	1	<0.009	16		
Calcium	D-11	1	63	29		
Chemical Oxygen Demand	D-11	1	<5	<5		
	F-21	3	<1		44	
Chloride	D-11	1	34	41		
	F-21	3	12		55	

Table V-88 (Continued)

NICKEL-COBALT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Cobalt	D-11	1	<0.006	0.079		
Fluoride	D-11	1	0.45	700		
	F-21	3	0.43		1.2	
Iron	D-11	1	0.066	0.53		
Magnesium	D-11	1	24	22		
Manganese	D-11	1	0.012	0.029		
Molybdenum	D-11	1	0.030	0.23		
Phenolics	F-21	1	<0.005		<0.005	
Phosphate	D-11	1	<4	<4		
	F-21	3	<4		<4	
Sodium	D-11	1	9.5	240		

Table V-88 (Continued)

NICKEL-COBALT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sulfate	D-11	1	53	41		
	F-21	3	130		94	
Tin	D-11	1	<0.12	<0.12		
Titanium	D-11	1	<0.005	0.11		
Total Dissolved Solids (TDS)	D-11	1	393	780		
	F-21	3	320		230	
Total Organic Carbon (TOC)	D-11	1	8	13		
	F-21	3	2		<1	
Total Solids (TS)	D-11	1	395	860		
	F-21	3	330		460	
Vanadium	D-11	1	0.016	0.016		
Yttrium	D-11	1	<0.002	0.003		
Conventional Pollutants						
Oil and Grease	D-11	1	<1	<1		
	F-21	1	<1		11	
Total Suspended Solids (TSS)	D-11	1	<1	15		
	F-21	3	22		190	
pH (standard units)	D-11	1	7.14	2.63		
	F-21	3	6.64		7.47	

Table V-88 (Continued)

NICKEL-COBALT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

2. Note that stream code V-5 also appears on the titanium wet air pollution control blowdown raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

Table V-89

NICKEL-COBALT ELECTROCOATING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	3,367	807.4	0.0	3,367	807.4
Average	3,367	807.4		3,367	807.4

Table V-90

PRECIOUS METALS ROLLING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	0.00	0.00
2	NR	NR	100	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

Table V-91

PRECIOUS METALS ROLLING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	25.00	6.00
2	NR	NR	P	46.47	11.14
3	NR	NR	P	160.1	38.40
4	67.6	16.2	NR	NR	NR
4	NR	NR	P	NR	NR
5	NR	NR	P	NR	NR
Average	67.60	16.20		77.20	18.51

P - Periodic discharge
NR - Data not reported

Table V-92

PRECIOUS METALS ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
4. benzene	I-5	1	ND		0.319	
11. 1,1,1-trichloroethane	I-5	1	0.022		ND	
44. methylene chloride	I-5	1	0.003		1.330	
87. trichloroethylene	I-5	1	ND		1.380	
114. antimony	I-5	1	<0.010		<0.010	
115. arsenic	I-5	1	<0.010		<0.010	
117. beryllium	I-5	1	<0.005		<0.050	
118. cadmium	I-5	1	<0.020		<0.200	
119. chromium (total)	I-5	1	<0.020		<0.200	
120. copper	I-5	1	0.200		25.0	
121. cyanide (total)	I-5	1	<0.02		<0.02	
122. lead	I-5	1	<0.050		1.00	
123. mercury	I-5	1	<0.0002		0.0006	

Table V-92 (Continued)

PRECIOUS METALS ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
124. nickel	I-5	1	<0.050		1.00	
125. selenium	I-5	1	<0.010		<0.010	
126. silver	I-5	1	<0.010		0.130	
127. thallium	I-5	1	<0.010		<0.010	
128. zinc	I-5	1	0.040		6.00	
Nonconventional Pollutants						
Acidity	I-5	1	<1		<1	
Alkalinity	I-5	1	40		2,100	
Aluminum	I-5	1	<0.100		<1.00	
Ammonia Nitrogen	I-5	1	0.06		0.4	
Barium	I-5	1	<0.050		<0.500	

Table V-92 (Continued)

PRECIOUS METALS ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	I-5	1	<0.100		<1.00	
Calcium	I-5	1	13.8		7.00	
Chemical Oxygen Demand (COD)	I-5	1	150		900	
Chloride	I-5	1	30		42	
Cobalt	I-5	1	<0.050		<0.500	
Fluoride	I-5	1	0.32		0.29	
Iron	I-5	1	0.100		26.5	
Magnesium	I-5	1	2.70		3.00	
Manganese	I-5	1	0.100		<0.500	
Molybdenum	I-5	1	<0.050		<0.500	
Phenolics	I-5	1	<0.005		<0.005	

Table V-92 (Continued)

PRECIOUS METALS ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phosphate	I-5	1	2.7		570	
Sodium	I-5	1	28.0		585	
Sulfate	I-5	1	740		8,500	
Tin	I-5	1	<0.050		<0.500	
Titanium	I-5	1	<0.050		<0.500	
Total Dissolved Solids (TDS)	I-5	1	850		32,000	A
Total Organic Carbon (TOC)	I-5	1	63		43	
Total Solids (TS)	I-5	1	11,500		33,000	

Table V-92 (Continued)

PRECIOUS METALS ROLLING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	I-5	1	<0.050		<0.500	
Yttrium	I-5	1	<0.050		<0.500	
Conventional Pollutants						
Oil and Grease	I-5	1	<1		1,500	
Total Suspended Solids (TSS)	I-5	1	300		500	
pH (standard units)	I-5	1	6.10		8.70	

A - Sample would not evaporate at 180C.

1. The following toxic pollutants were not detected in this waste stream: 1-3, 5-10, 12-43, 45-86, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-93

PRECIOUS METALS DRAWING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

Table V-94

PRECIOUS METALS DRAWING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
1	NR	NR	100	0.00	0.00
2	NR	NR	100	0.00	0.00
3	35,500	8,520	P	9.47	2.27
4	NR	NR	P	14.77	3.54
5	NR	NR	P	32.90	7.89
5	NR	NR	P	38.63	9.26
6	NR	NR	P	141.8	33.99
2	148.4	35.60	0.0	142.4	34.15
3	NR	NR	P	NR	NR
7	NR	NR	P	NR	NR
8	NR	NR	NR	NR	NR
Average	17,820	4,278		63.32	15.18

P - Periodic discharge
NR - Data not reported

Table V-95

PRECIOUS METALS DRAWING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Toxic Pollutants						
11. 1,1,1-trichloroethane	I-7	1	0.022		3.040	
44. methylene chloride	I-7	1	0.003		0.879	
114. antimony	I-7	1	<0.010		<0.010	
115. arsenic	I-7	1	<0.010		<0.010	
117. beryllium	I-7	1	<0.005		<0.005	
118. cadmium	I-7	1	<0.020		<0.020	
119. chromium (total)	I-7	1	<0.020		<0.020	
120. copper	I-7	1	0.200		46.4	
121. cyanide (total)	I-7	1	<0.02		<0.02	
122. lead	I-7	1	<0.050		1.05	
123. mercury	I-7	1	<0.0002		<0.0002	
124. nickel	I-7	1	<0.050		0.750	
125. selenium	I-7	1	<0.010		<0.010	
126. silver	I-7	1	<0.010		0.090	
127. thallium	I-7	1	<0.010		<0.010	
128. zinc	I-7	1	0.040		5.18	
Nonconventional Pollutants						
Acidity	I-7	1	<1		<1	
Alkalinity	I-7	1	40		1,300	
Aluminum	I-7	1	<0.100		0.100	
Ammonia Nitrogen	I-7	1	0.06		0.4	
Barium	I-7	1	<0.050		<0.050	

Table V-95 (Continued)

PRECIOUS METALS DRAWING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)						
Boron	I-7	1	<0.100		0.100	
Calcium	I-7	1	13.8		5.70	
Chemical Oxygen Demand (COD)	I-7	1	150		1,600	
Chloride	I-7	1	30		57	
Cobalt	I-7	1	<0.050		0.050	
Fluoride	I-7	1	0.32		0.14	
Iron	I-7	1	0.100		7.10	
Magnesium	I-7	1	2.70		1.90	
Manganese	I-7	1	<0.050		0.150	
Molybdenum	I-7	1	<0.050		<0.050	
Phenolics	I-7	1	<0.005		<0.005	
Phosphate	I-7	1	2.7		1,000	
Sodium	I-7	1	28.0		109	
Sulfate	I-7	1	740		1,600	
Tin	I-7	1	<0.050		0.150	
Titanium	I-7	1	<0.050		<0.050	
Total Dissolved Solids (TDS)	I-7	1	850		420	
Total Organic Carbon (TOC)	I-7	1	63		18	
Total Solids (TS)	I-7	1	11,500		1,430	
Vanadium	I-7	1	<0.050		<0.050	
Yttrium	I-7	1	<0.050		<0.050	

Table V-95 (Continued)

PRECIOUS METALS DRAWING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Conventional Pollutants						
Oil and Grease	I-7	1	<1		33,000	
Total Suspended Solids (TSS)	I-7	1	300		<1	
pH (standard units)	I-7	1	6.10		8.20	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-43, and 45-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-96

PRECIOUS METALS DRAWING SPENT SOAP SOLUTIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	3.12	0.748
2	NR	NR	NR	NR	NR
Average	NR	NR		3.12	0.748

P - Periodic discharge
NR - Data not reported

Table V-97

PRECIOUS METALS METAL POWDER PRODUCTION
ATOMIZATION WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	6,922	1,660	0.0	6,683	1,603
Average	6,922	1,660		6,683	1,603

Table V-98

PRECIOUS METALS DIRECT CHILL CASTING
CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	64,200	15,400	100	0.00	0.00
2	2,590	622.0	0.0	2,590	622.0
2	19,000	4,550	0.0	19,000	4,550
3	145,000	34,700	NR	NR	NR
Average	57,700	13,820		10,800	2,590

NR - Data not reported

Table V-99

PRECIOUS METALS SHOT CASTING
CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	3,670	880.2	0.0	3,670	880.2
Average	3,670	880.2		3,670	880.2

Table V-100
PRECIOUS METALS SHOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	I-3	1	0.022	0.018		
44. methylene chloride	I-3	1	0.003	0.004		
86. toluene	I-3	1	ND	0.003		
87. trichloroethylene	I-3	1	ND	0.002		
114. antimony	I-3	1	<0.010	0.050	<0.010	
115. arsenic	I-3	1	<0.010	<0.010	<0.010	
117. beryllium	I-3	1	<0.005	<0.005	<0.005	
118. cadmium	I-3	1	<0.020	0.040	9.88	
119. chromium (total)	I-3	1	<0.020	<0.020	<0.020	
120. copper	I-3	1	0.200	0.600	0.500	
121. cyanide (total)	I-3	1	<0.02	<0.02	<0.02	
122. lead	I-3	1	<0.050	0.050	<0.050	
123. mercury	I-3	1	<0.0002	<0.0002	<0.0002	
124. nickel	I-3	1	<0.050	<0.050	0.100	
125. selenium	I-3	1	<0.010	<0.010	<0.010	
126. silver	I-3	1	<0.010	0.050	0.040	
127. thallium	I-3	1	<0.010	<0.010	<0.010	
128. zinc	I-3	1	0.040	0.520	5.66	
Nonconventional Pollutants						
Acidity	I-3	1	<1	<1	<1	
Alkalinity	I-3	1	40	47	56	
Aluminum	I-3	1	<0.100	<0.100	<0.100	

Table V-100 (Continued)

PRECIOUS METALS SHOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	I-3	1	0.06	0.04	0.03	
Barium	I-3	1	<0.050	<0.050	<0.050	
Boron	I-3	1	<0.100	1.70	9.00	
Calcium	I-3	1	13.8	11.1	11.1	
Chemical Oxygen Demand (COD)	I-3	1	150	35	1,500	
Chloride	I-3	1	30	28	29	
Cobalt	I-3	1	<0.050	<0.050	<0.050	
Fluoride	I-3	1	0.32	0.03	0.19	
Iron	I-3	1	0.100	0.350	0.100	
Magnesium	I-3	1	2.70	2.40	2.40	
Manganese	I-3	1	0.100	0.100	0.050	
Molybdenum	I-3	1	<0.050	<0.050	<0.050	
Phenolics	I-3	1	<0.005	<0.005	<0.005	
Phosphate	I-3	1	2.7	8.2	12	
Sodium	I-3	1	28.0	28.7	28.4	
Sulfate	I-3	1	740	400	330	
Tin	I-3	1	<0.050	<0.050	<0.050	
Titanium	I-3	1	<0.050	<0.050	<0.050	
Total Dissolved Solids (TDS)	I-3	1	850	150	580	
Total Organic Carbon (TOC)	I-3	1	63	<1	38	
Total Solids (TS)	I-3	1	11,500	230	590	
Vanadium	I-3	1	<0.050	<0.050	<0.050	
Yttrium	I-3	1	<0.050	<0.050	<0.050	

Table V-100 (Continued)

PRECIOUS METALS SHOT CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	I-3	1	<1	<1	54	
Total Suspended Solids (TSS)	I-3	1	300	91	<1	
pH (standard units)	I-3	1	6.10	6.34	6.70	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-43, 45-85, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-101

PRECIOUS METALS STATIONARY CASTING
CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	P	61.30	14.70
3	52,120	12,500	99.8	110.2	26.43
4	NR	NR	NR	NR	NR
5	NR	NR	NR	NR	NR
Average	52,120	12,500		85.76	20.57

P - Periodic discharge
NR - Data not reported

Table V-102

PRECIOUS METALS SEMI-CONTINUOUS AND CONTINUOUS CASTING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	255,500	61,270	100	0.00	0.00
2	402,000	96,400	100	0.00	0.00
3	10,349	2,482	0.0	10,349	2,482
4	NR	NR	0.0	NR	NR
5	NR	NR	NR	NR	NR
Average	222,600	53,380		10,349	2,482

NR - Data not reported

Table V-103

PRECIOUS METALS SEMI-CONTINUOUS AND CONTINUOUS CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Toxic Pollutants							
114. antimony	I-2	2	<0.010				<0.010
115. arsenic	I-2	2	<0.010				<0.010
117. beryllium	I-2	2	<0.005				<0.005
118. cadmium	I-2	2	<0.020				<0.020
119. chromium (total)	I-2	2	<0.020				<0.020
120. copper	I-2	2	0.200				0.100
121. cyanide (total)	I-2	1	<0.02				0.50
122. lead	I-2	2	<0.050				<0.050
123. mercury	I-2	2	<0.0002				0.0002
124. nickel	I-2	2	<0.050				<0.050
125. selenium	I-2	2	<0.010				<0.010
126. silver	I-2	2	<0.010				<0.010
127. thallium	I-2	2	<0.010				<0.010
128. zinc	I-2	2	0.040				<0.020

Table V-103 (Continued)

PRECIOUS METALS SEMI-CONTINUOUS AND CONTINUOUS CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants							
Acidity	I-2	2	<1				<1
Alkalinity	I-2	2	40				43
Aluminum	I-2	2	<0.100				<0.100
Ammonia Nitrogen	I-2	2	0.06				0.13
Barium	I-2	2	<0.050				<0.050
Boron	I-2	2	<0.100				<0.100
Calcium	I-2	2	13.8				11.8
Chemical Oxygen Demand (COD)	I-2	2	150				91
Chloride	I-2	2	30				28
Cobalt	I-2	2	<0.050				<0.050
Fluoride	I-2	2	0.32				0.32
Iron	I-2	2	0.100				0.200
Magnesium	I-2	2	2.70				2.40
Manganese	I-2	2	0.100				0.100

Table V-103 (Continued)

PRECIOUS METALS SEMI-CONTINUOUS AND CONTINUOUS CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Molybdenum	I-2	2	<0.050				<0.050
Phenolics	I-2	1	<0.005				<0.005
Phosphate	I-2	2	2.7				1.9
Sodium	I-2	2	28.0				28.2
Sulfate	I-2	2	740				780
Tin	I-2	2	<0.050				<0.050

Table V-103 (Continued)

PRECIOUS METALS SEMI-CONTINUOUS AND CONTINUOUS CASTING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Titanium	I-2	2	<0.050				<0.050
Total Dissolved Solids (TDS)	I-2	2	850				110
Total Organic Carbon (TOC)	I-2	2	63				<1
Total Solids (TS)	I-2	2	11,500				110
Vanadium	I-2	2	<0.050				<0.05
Yttrium	I-2	2	<0.050				<0.050
Conventional Pollutants							
Oil and Grease	I-2	1	<1				6
Total Suspended Solids (TSS)	I-2	2	300				43
pH (standard units)	I-2	2	6.10				6.50

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-104

PRECIOUS METALS HEAT TREATMENT
CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
2	4,170	1,000	100	0.00	0.00
3	NR	NR	100	0.00	0.00
4	NR	NR	P	1.01	0.24
4	658.7	158.0	0.0	658.8	158.0
2	938.0	225.0	0.0	938.0	225.0
1	NR	NR	P	1,318	316.1
5	1,377	330.2	0.0	1,377	330.2
5	2,616	627.4	0.0	2,616	627.4
4	3,065	735.0	0.0	3,065	735.0
4	4,170	1,000	0.0	4,170	1,000
2	9,260	2,220	0.0	9,260	2,220
2	9,380	2,250	0.0	9,380	2,250
2	147,000	35,200	63.0	54,200	13,000
6	69,830	16,750	0.0	69,830	16,750
7	NR	NR	P	NR	NR
8	NR	NR	NR	NR	NR
9	18,200	4,360	NR	NR	NR
10	NR	NR	0.0	NR	NR
11	NR	NR	NR	NR	NR
Average	22,560	5,404		13,070	3,134

P - Periodic discharge
NR - Data not reported

Table V-105

PRECIOUS METALS SURFACE TREATMENT SPENT BATHS

Plant	Wastewater Discharge L/kkg	gal/ton
1	0.00	0.00
2	0.00	0.00
1	0.00	0.00
3	0.00	0.00
4	7.59	1.82
5	54.03	12.96
6	139.5	33.45
7	182.9	43.85
8	NR	NR
9	NR	NR
10	NR	NR
11	NR	NR
10	NR	NR
12	NR	NR
13	NR	NR
14	NR	NR
5	NR	NR
15	NR	NR
16	NR	NR
17	NR	NR
Average	96.3	23.1

NR - Data not reported

Table V-106

PRECIOUS METALS SURFACE TREATMENT RINSEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	123.00	29.40	100	0.00	0.00
2	231.40	55.49	0.0	231.40	55.49
3	NR	NR	P	350.60	84.07
4	1,390	333.0	0.0	1,390	333.0
5	5,365	1,287	0.0	5,365	1,287
6	NR	NR	CCR3	5,920	1,420
7	6,192	1,485	0.0	6,192	1,485
8	6,933	1,663	0.0	6,933	1,663
9	22,880	5,488	0.0	22,880	5,488
10	NR	NR	CCR2	60,630	14,540
11	NR	NR	NR	NR	NR
7	NR	NR	0.0	NR	NR
12	NR	NR	NR	NR	NR
13	NR	NR	NR	NR	NR
14	NR	NR	P	NR	NR
15	NR	NR	0.0	NR	NR
16	NR	NR	P	NR	NR
13	NR	NR	NR	NR	NR
17	NR	NR	NR	NR	NR
Average	6,160	1,477		12,210	2,928

P - Periodic discharge
NR - Data not reported

CCR2 - Two-stage countercurrent cascade rinse.
CCR3 - Two-stage countercurrent cascade rinse followed by a single stage rinse.

Table V-107

PRECIOUS METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Toxic Pollutants							
114. antimony	I-10	2	<0.010		<0.010	<0.010	<0.010
	M-5	1	<0.010			<0.020	
115. arsenic	I-10	2	<0.010		<0.010	<0.010	<0.010
	M-5	1	<0.010			<0.010	
117. beryllium	I-10	2	<0.005		<0.005	<0.005	<0.005
	M-5	1	<0.005			<0.005	
118. cadmium	I-10	2	<0.020		<0.020	<0.020	<0.020
	M-5	1	<0.020			11.1	
119. chromium (total)	I-10	2	<0.020		0.020	<0.020	<0.020
	M-5	1	<0.020			<0.020	
120. copper	I-10	2	0.200		2.50	1.80	2.05
	M-5	1	<0.050			60.6	
121. cyanide (total)	I-10	1	<0.02		<0.02	<0.02	<0.02
	M-5	1	<0.02			<0.02	
122. lead	I-10	2	<0.050		0.100	<0.050	0.100
	M-5	1	<0.050			<1.00	
123. mercury	I-10	2	<0.0002		<0.0002	<0.0002	<0.0002
	M-5	1	<0.0002			<0.0002	

Table V-107 (Continued)

PRECIOUS METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Toxic Pollutants (Continued)							
124. nickel	I-20	2	<0.050		0.100	0.050	0.100
	M-5	1	<0.050			0.300	
125. selenium	I-10	2	<0.010		<0.020	<0.020	<0.010
	M-5	1	<0.010			<0.010	
126. silver	I-10	2	<0.010		<0.010	<0.010	<0.010
	M-5	1	<0.010			6.70	
	M-11	1	<0.0005		0.714		
127. thallium	I-10	2	<0.010		<0.010	<0.010	<0.010
	M-5	1	<0.010			<0.010	
128. zinc	I-10	2	0.040		4.66	1.84	2.32
	M-5	1	<0.010			0.260	
Nonconventional Pollutants							
Acidity	I-10	2	<1		1,400	120	470
	M-5	1	<1			430	
Alkalinity	I-10	2	40		<1	<1	<1
	M-5	1	100			<1	
Aluminum	I-10	2	<0.100		0.100	<0.100	0.100
	M-5	1	0.200			0.300	

Table V-107 (Continued)

PRECIOUS METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Ammonia Nitrogen	I-10	2	0.06		0.2	0.04	0.21
	M-5	1	<0.1			0.2	
Barium	I-10	2	<0.050		<0.050	<0.050	<0.050
	M-5	1	<0.050			<0.050	
Boron	I-10	2	<0.100		<0.100	<0.100	<0.100
	M-5	1	<0.100			<0.100	
Calcium	I-10	2	13.8		14.1	9.10	13.2
	M-5	1	36.5			36.5	
Chemical Oxygen Demand (COD)	I-10	2	150		1,800	1,800	100
	M-5	1	<5			<5	
Chloride	I-10	2	30		18	28	28
	M-5	1	10			<0.1	
Cobalt	I-10	2	<0.050		<0.050	<0.050	<0.050
	M-5	1	<0.050			<0.050	
Fluoride	I-10	2	0.32		0.10	0.07	0.20
	M-5	1	0.85			0.94	

Table V-107 (Continued)

PRECIOUS METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Iron	I-10	2	0.100		0.650	0.250	0.300
	M-5	1	<0.050			0.150	
Magnesium	I-10	2	2.70		2.70	1.80	2.60
	M-5	1	11.3			11.4	
Manganese	I-10	2	0.100		0.100	0.050	0.050
	M-5	1	<0.050			<0.050	
Molybdenum	I-10	2	<0.050		<0.050	<0.050	<0.050
	M-5	1	<0.050			<0.050	
Phenolics	I-10	1	0.005		<0.005	<0.005	<0.005
	M-5	1	<0.005			<0.005	
Phosphate	I-10	2	2.7		39	44	33
	M-5	1	<4			<4	
Sodium	I-10	2	28.0		28.2	19.0	28.6
	M-5	1	5.20			5.40	
Sulfate	I-10	2	740		1,700	630	800
	M-5	1	43			54	
Tin	I-10	2	<0.050		<0.500	<0.050	<0.500
	M-5	1	<0.050			<0.050	

Table V-107 (Continued)

PRECIOUS METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Titanium	I-10	2	<0.050		<0.050	<0.050	<0.050
	M-5	1	<0.050			<0.050	
Total Dissolved Solids (TDS)	I-10	2	850		900	950	360
	M-5	1	270.0			510.0	
Total Organic Carbon (TOC)	I-10	2	63		57	28	<1
	M-5	1	<1			10	
Total Solids (TS)	I-10	2	11,500		4,000	930	390
	M-5	1	280.0			800	
Vanadium	I-10	2	<0.050		<0.050	<0.050	<0.050
	M-5	1	<0.050			<0.050	
Yttrium	I-10	2	<0.050		<0.050	<0.050	<0.050
	M-5	1	<0.050			<0.050	
Conventional Pollutants							
Oil and Grease	I-10	1	<1		4	3	8
	M-5	1	3.0			<1	

Table V-107 (Continued)

PRECIOUS METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Conventional Pollutants (Continued)							
Total Suspended Solids (TSS)	I-10	2	300		3,000	<1	11
	M-5	1	14.0			310	
pH (standard units)	I-10	2	6.10		1.90	2.20	1.30
	M-5	1	7.30			2.50	

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-108

PRECIOUS METALS ALKALINE CLEANING SPENT BATHS

Plant	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	60.00	14.40
2	NR	NR
3	NR	NR
4	NR	NR
5	NR	NR
6	NR	NR
7	NR	NR
8	NR	NR
Average	60.00	14.40

NR - Data not reported

Table V-109

PRECIOUS METALS ALKALINE CLEANING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	3,149	755.1	0.0	3,149	755.1
2	6,933	1,663	0.0	6,933	1,663
1	15,840	3,800	0.0	15,840	3,800
1	18,890	4,530	0.0	18,890	4,530
3	NR	NR	NR	NR	NR
4	NR	NR	NR	NR	NR
5	NR	NR	NR	NR	NR
Average	11,200.00	2,687.00		11,200.00	2,687.00

NR - Data not reported

Table V-110

PRECIOUS METALS ALKALINE CLEANING
PREBONDING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	10.20	2.45	0.0	10.20	2.45
2	93,800	22,500	P	126.0	30.20
3	173.8	41.67	0.0	173.8	41.67
4	873.7	209.5	0.0	873.7	209.5
4	6,635	1,591	0.0	6,635	1,591
5	16,480	3,951	NR	16,480	3,951
6	20,030	4,804	0.0	20,030	4,804
7	83,400	20,000	0.0	83,400	20,000
Average	27,680	6,637		15,970	3,829

P - Periodic discharge
NR - Data not reported

Table V-111

PRECIOUS METALS ALKALINE CLEANING PREBONDING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Toxic Pollutants							
11. 1,1,1-trichloroethane	I-9	1	0.022		0.008	0.007	0.007
	K-4	1	ND	0.010	0.011	0.015	
44. methylene chloride	I-9	1	0.003		0.012	0.016	0.006
	K-4	1	0.003	0.133	0.006	0.005	
45. methyl chloride (chloromethane)	I-9	1	ND		0.070	ND	ND
	K-4	1	ND	ND	ND	ND	
65. phenol	I-9	2	ND		ND	ND	0.001
	K-4	6	ND	ND	ND	ND	
66. bis(2-ethylhexyl) phthalate	I-9	2	ND		ND	ND	ND
	K-4	6	ND	ND	0.005	ND	
86. toluene	I-9	1	ND		ND	ND	ND
	K-4	1	0.002	0.818	0.006	0.003	
87. trichloroethylene	I-9	1	ND		ND	ND	0.025
	K-4	1	ND	ND	ND	ND	
114. antimony	I-8	2	<0.010		<0.020	<0.010	
	I-9	2	<0.010		<0.010	<0.010	<0.010
	K-4	6	<0.010	<0.010	<0.010	<0.010	
115. arsenic	I-8	2	<0.010		<0.010	<0.010	
	I-9	2	<0.010		<0.010	<0.010	<0.010
	K-4	6	<0.010	<0.010	<0.010	<0.010	
117. beryllium	I-8	2	<0.005		<0.005	<0.005	
	I-9	2	<0.005		<0.005	<0.005	<0.005
	K-4	6	<0.005	<0.005	<0.005	<0.005	
118. cadmium	I-8	2	<0.020		<0.020	<0.020	
	I-9	2	<0.020		0.420	0.040	0.060
	K-4	6	<0.020	0.120	0.080	0.060	
119. chromium (total)	I-8	2	<0.020		<0.020	<0.020	
	I-9	2	<0.020		<0.020	<0.020	<0.020
	K-4	6	<0.020	0.140	0.200	0.180	
120. copper	I-8	2	0.200		2.25	0.750	
	I-9	2	0.200		0.600	2.55	1.25
	K-4	6	0.100	4.95	5.95	3.80	

Table V-111 (Continued)

PRECIOUS METALS ALKALINE CLEANING PREBONDING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Toxic Pollutants (Continued)							
121. cyanide (total)	I-8	1	<0.02		<0.02	<0.02	
	I-9	1	<0.02		<0.02	<0.02	<0.02
	K-4	1	0.09	0.28	0.077	<0.02	
122. lead	I-8	2	<0.050		0.100	<0.050	
	I-9	2	<0.050		0.050	0.150	0.200
	K-4	6	<0.050	0.250	0.050	<0.050	
123. mercury	I-8	2	<0.0002		<0.0002	<0.0002	
	I-9	1	<0.0002		<0.0002	<0.0002	<0.0002
	K-4	6	<0.0002	<0.0002	<0.0002	<0.0002	
124. nickel	I-8	2	<0.050		3.60	<0.050	
	I-9	2	<0.050		0.600	0.200	0.150
	K-4	6	<0.050	0.250	0.300	0.350	
125. selenium	I-8	2	<0.010		<0.020	<0.010	
	I-9	2	<0.010		<0.010	<0.010	<0.010
	K-4	6	<0.010	<0.010	<0.010	<0.010	
126. silver	I-8	2	<0.010		<0.010	<0.010	
	I-9	2	<0.010		0.100	0.040	0.040
	K-4	6	<0.010	0.060	0.020	0.010	
127. thallium	I-8	2	<0.010		<0.010	<0.010	
	I-9	2	<0.010		<0.010	<0.010	<0.010
	K-4	6	<0.010	<0.010	<0.010	<0.010	
128. zinc	I-8	2	0.040		0.980	0.280	
	I-9	2	0.040		0.060	0.100	0 120
	K-4	6	<0.020	0.400	2.32	0.780	
Nonconventional Pollutants							
Acidity	I-8	2	<1		180	120	
	I-9	2	<1		<1	<1	<1
	K-4	6	<1	<1	<1	<1	
Alkalinity	I-8	2	40		<1	<1	
	I-9	2	40		45	48	37
	K-4	6	43	10	1.2	15	
Aluminum	I-8	2	<0.100		<0.100	<0.100	
	I-9	2	<0.100		<0.100	<0.100	<0.100
	K-4	6	<0.100	10.7	26.1	43.9	

Table V-111 (Continued)

PRECIOUS METALS ALKALINE CLEANING PREBONDING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Ammonia Nitrogen	I-8	2	0.06		0.08	0.04	
	I-9	2	0.06		0.1	0.05	0.03
	K-4	6	0.17	0.32	0.07	0.07	
Barium	I-8	2	<0.050		<0.050	<0.050	
	I-9	2	<0.050		<0.050	<0.050	<0.050
	K-4	6	<0.050	1.40	0.250	0.650	
Boron	I-8	2	<0.100		22.1	9.70	
	I-9	2	<0.100		<0.100	<0.100	<0.100
	K-4	6	<0.100	<0.100	<0.100	0.200	
Calcium	I-8	2	13.8		14.7	15.1	
	I-9	2	13.8		13.6	12.8	12.3
	K-4	6	8.70	10.2	10.3	10.8	
Chemical Oxygen Demand (COD)	I-8	2	150		320	1,900	
	I-9	2	150		18	150	78
	K-4	6	34	200	87	160	
Chloride	I-8	2	30		30	31	
	I-9	2	30		<1	26	30
	K-4	6	35	55	70	62	
Cobalt	I-8	2	<0.050		<0.050	<0.050	
	I-9	2	<0.050		<0.050	<0.050	<0.050
	K-4	6	<0.050	<0.050	<0.050	<0.050	
Fluoride	I-8	2	0.32		0.51	0.17	
	I-9	2	0.32		0.08	0.07	0.68
	K-4	6	1.31	7.7	1.6	1.7	
Iron	I-8	2	<0.050		1.00	0.250	
	I-9	2	<0.050		0.650	0.400	0.400
	K-4	6	<0.050	4.75	6.15	4.85	
Magnesium	I-8	2	<0.050		2.80	2.80	
	I-9	2	<0.050		2.70	2.50	2.50
	K-4	6	2.10	2.20	2.20	2.20	
Manganese	I-8	2	<0.050		0.150	0.100	
	I-9	2	<0.050		0.100	0.050	0.050
	K-4	6	<0.050	0.150	0.150	0.150	

Table V-111 (Continued)

PRECIOUS METALS ALKALINE CLEANING PREBONDING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Molybdenum	I-8	2	<0.050		<0.050	<0.050	
	I-9	2	<0.050		<0.050	<0.050	<0.050
	K-4	6	<0.050	<0.050	<0.050	<0.050	
Phenolics	I-8	1	<0.005		<0.005	<0.005	
	I-9	1	<0.005		<0.005	<0.005	<0.005
	K-4	1	<0.005	<0.005	<0.005	<0.005	
Phosphate	I-8	2	2.7		35	15	
	I-9	2	2.7		16	30	18
	K-4	6	4.8	100	100	58	
Sodium	I-8	2	28.0		436	77.1	
	I-9	2	28.0		37.1	35.4	30.2
	K-4	6	32.9	50.3	53.8	60.3	
Sulfate	I-8	2	740		1,500	450	
	I-9	2	740		300	480	630
	K-4	6	400	410	630	840	
Tin	I-8	2	<0.050		<0.050	<0.050	
	I-9	2	<0.050		<0.050	<0.050	<0.050
	K-4	6	<0.050	<0.050	<0.050	<0.050	
Titanium	I-8	2	<0.050		<0.050	<0.050	
	I-9	2	<0.050		<0.050	<0.050	<0.050
	K-4	6	<0.050	0.450	<0.050	0.150	
Total Dissolved Solids (TDS)	I-8	2	850		2,500	650	
	I-9	2	850		170	1,850	116
	K-4	6	140	225	200	240	
Total Organic Carbon (TOC)	I-8	2	63		15	17	
	I-9	2	63		4	18	5
	K-4	6	<1	19	14	22	
Total Solids (TS)	I-8	2	11,500		2,900	680	
	I-9	2	11,500		230	1,900	130
	K-4	6	160	300	450		
Vanadium	I-8	2	<0.050		<0.050	<0.050	
	I-9	2	<0.050		<0.050	<0.050	<0.050
	K-4	6	<0.050	<0.050	<0.050	<0.050	

Table V-111 (Continued)

PRECIOUS METALS ALKALINE CLEANING PREBONDING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/L) Source	Day 1	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)							
Yttrium	I-8	2	<0.050		<0.050	<0.050	
	I-9	2	<0.050		<0.050	<0.050	<0.050
	K-4	6	<0.050	<0.050	<0.050	<0.050	
Conventional Pollutants							
Oil and Grease	I-8	1	<1		5	15	
	I-9	1	<1		5	<1	<1
	K-4	1	<1	16	10	10	
Total Suspended Solids (TSS)	I-8	2	300		400	<1	
	I-9	2	300		50	<1	19
	K-4	6	16	47	68	180	
pH (standard units)	I-8	2	6.10		2.30	3.70	
	I-9	2	6.10		6.40	6.10	6.10
	K-4	6	6.70	5.40	4.60	7.90	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-43, 46-64, 67-85, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-112

PRECIOUS METALS TUMBLING OR BURNISHING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	992.6	238.0	0.0	992.6	238.0
2	1,053	252.5	0.0	1,053	252.5
1	5,745	1,378	0.0	5,745	1,378
3	40,700	9,760	0.0	40,700	9,760
4	NR	NR	0.0	NR	NR
Average	12,120	2,907		12,120	2,907

NR - Data not reported

Table V-113

PRECIOUS METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	I-4	1	0.022	0.017		
	K-3	1	ND	ND	ND	ND
16. chloroethane	I-4	1	ND	0.001		
	K-3	1	ND	ND	ND	ND
44. methylene chloride	I-4	1	0.003	0.004		
	K-3	1	0.003	0.041	0.031	0.007
49. trichlorofluoromethane	I-4	1	ND	0.001		
	K-3	1	ND	ND	ND	ND
86. toluene	I-4	1	ND	ND		
	K-3	1	0.002	0.028	0.088	0.005
114. antimony	I-4	2	<0.010	0.050		
	K-3	6	<0.010	<0.010	<0.010	<0.010
115. arsenic	I-4	2	<0.010	<0.020		
	K-3	6	<0.010	<0.010	<0.010	<0.010
117. beryllium	I-4	2	<0.005	<0.005		
	K-3	6	<0.005	<0.005	<0.005	<0.005
118. cadmium	I-4	2	<0.020	0.060		
	K-3	6	<0.020	0.720	0.700	0.600
119. chromium (total)	I-4	2	<0.020	<0.020		
	K-3	6	<0.020	3.18	0.500	0.120
120. copper	I-4	2	0.200	142		
	K-3	6	0.100	5.50	5.10	6.25
121. cyanide (total)	I-4	1	<0.02	<0.02		
	K-3	1	0.09	<0.02	<0.02	0.08
122. lead	I-4	2	<0.050	1.85		
	K-3	6	<0.050	<0.050	<0.050	<0.050
123. mercury	I-4	2	<0.0002	<0.0002		
	K-3	6	<0.0002	0.0005	0.0004	<0.0002
124. nickel	I-4	2	<0.050	0.100		
	K-3	6	<0.050	1.35	3.25	2.10

Table V-113 (Continued)

PRECIOUS METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
125. selenium	I-4	2	<0.010	<0.010		
	K-3	6	<0.010	<0.010	<0.010	<0.010
126. silver	I-4	2	<0.010	0.070		
	K-3	6	<0.010	0.080	0.220	0.080
127. thallium	I-4	2	<0.010	<0.010		
	K-3	6	<0.010	<0.010	<0.010	<0.010
128. zinc	I-4	2	0.040	3.16		
	K-3	6	<0.020	0.160	0.180	0.140
Nonconventional Pollutants						
Acidity	I-4	2	<1	190		
	K-3	6	<1	<1	<1	<1
Alkalinity	I-4	2	40	<1		
	K-3	6	43	130	120	96
Aluminum	I-4	2	<0.100	0.400		
	K-3	6	<0.100	0.300	0.300	0.100
Ammonia Nitrogen	I-4	2	0.06	0.03		
	K-3	6	0.17	0.09	0.08	1.1
Barium	I-4	2	<0.050	<0.050		
	K-3	6	<0.050	<0.050	<0.050	<0.050
Boron	I-4	2	<0.100	0.400		
	K-3	6	<0.100	0.700	0.300	10.7
Calcium	I-4	2	13.8	11.1		
	K-3	6	8.70	9.30	9.70	9.90
Chemical Oxygen Demand (COD)	I-4	2	150	51		
	K-3	6	34	250	190	160
Chloride	I-4	2	30	24		
	K-3	6	35	42	47	40
Cobalt	I-4	2	<0.050	<0.050		
	K-3	6	<0.050	<0.050	<0.050	<0.050

Table V-113 (Continued)

PRECIOUS METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Fluoride	I-4	2	0.32	0.25		
	K-3	6	1.31	1.6	1.1	1.3
Iron	I-4	2	0.100	0.750		
	K-3	6	<0.050	3.05	7.85	5.30
Magnesium	I-4	2	2.70	2.40		
	K-3	6	2.10	2.20	2.10	2.10
Manganese	I-4	2	0.100	0.100		
	K-3	6	<0.050	1.05	0.450	1.00
Molybdenum	I-4	2	<0.050	<0.050		
	K-3	6	<0.050	<0.050	<0.050	<0.050
Phenolics	I-4	1	<0.005	<0.005		
	K-3	1	<0.005	<0.005	<0.005	<0.005
Phosphate	I-4	2	2.7	2,800		
	K-3	6	4.8	130	110	130
Sodium	I-4	2	28.0	371		
	K-3	6	32.9	89.5	58.2	68.3
Sulfate	I-4	2	740	8,300		
	K-3	6	400	680	600	760
Tin	I-4	2	<0.050	<0.050		
	K-3	6	<0.050	<0.050	<0.050	<0.050
Titanium	I-4	2	<0.050	<0.050		
	K-3	6	<0.050	<0.050	<0.050	<0.050
Total Dissolved Solids (TDS)	I-4	2	850	9,700		
	K-3	6	140	290	280	280
Total Organic Carbon (TOC)	I-4	2	63	27		
	K-3	6	<1	49	46	57
Total Solids (TS)	I-4	2	11,500	10,000		
	K-3	6	160	410	410	380

Table V-113 (Continued)

PRECIOUS METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	I-4	2	<0.050	<0.050		
	K-3	6	<0.050	<0.050	<0.050	<0.050
Yttrium	I-4	2	<0.050	<0.050		
	K-3	6	<0.050	<0.050	<0.050	<0.050
Conventional Pollutants						
Oil and Grease	I-4	1	<1	<1		
	K-3	1	<1	40	38	<1
Total Suspended Solids (TSS)	I-4	2	300	10		
	K-3	6	16	100	110	62
pH (standard units)	I-4	2	6.10	2.52		
	K-3	6	6.70	8.70	7.30	6.50

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-15, 17-43, 45-48, 50-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-114

PRECIOUS METALS SAWING OR GRINDING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

Table V-115

PRECIOUS METALS SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	2,220	533.0	P	3.17	0.76
1	2,270	545.0	P	8.92	2.14
2	NR	NR	P	177.6	42.60
2	NR	NR	P	2,775	665.4
Average	2,245	539.0		741.1	177.7

P - Periodic discharge
NR - Data not reported

Table V-116

PRECIOUS METALS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Toxic Pollutants						
11. 1,1,1-trichloroethane	I-6	1	0.022		ND	
44. methylene chloride	I-6	1	0.003		0.110	
65. phenol	I-6	1	ND		0.038	
114. antimony	I-6	1	<0.010		<0.010	
115. arsenic	I-6	1	<0.010		<0.010	
117. beryllium	I-6	1	<0.005		<0.005	
118. cadmium	I-6	1	<0.020		<0.020	
119. chromium (total)	I-6	1	<0.020		<0.240	
120. copper	I-6	1	0.200		0.550	
121. cyanide (total)	I-6	1	<0.02		<0.02	
122. lead	I-6	1	<0.050		0.100	
123. mercury	I-6	1	<0.0002		<0.0002	
124. nickel	I-6	1	<0.050		0.150	
125. selenium	I-6	1	<0.010		<0.010	
126. silver	I-6	1	<0.010		<0.010	
127. thallium	I-6	1	<0.010		<0.010	
128. zinc	I-6	1	0.040		0.920	
Nonconventional Pollutants						
Acidity	I-6	1	<1		<1	
Alkalinity	I-6	1	40		81	
Aluminum	I-6	1	<0.100		0.100	
Ammonia Nitrogen	I-6	1	0.06		0.02	

Table V-116 (Continued)

PRECIOUS METALS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)						
Barium	I-6	1	<0.050		<0.050	
Boron	I-6	1	<0.100		5.10	
Calcium	I-6	1	13.8		15.7	
Chemical Oxygen Demand (COD)	I-6	1	150		2700	
Chloride	I-6	1	30		40	
Cobalt	I-6	1	<0.050		<0.050	
Fluoride	I-6	1	0.32		0.09	
Iron	I-6	1	0.100		16.7	
Magnesium	I-6	1	2.70		3.50	
Manganese	I-6	1	0.100		0.500	
Molybdenum	I-6	1	<0.050		<0.050	
Phenolics	I-6	1	<0.005		<0.005	
Phosphate	I-6	1	2.7		11	

Table V-116 (Continued)

PRECIOUS METALS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)						
Sodium	I-6	1	28.0		146	
Sulfate	I-6	1	740		720	
Tin	I-6	1	<0.050		<0.050	
Titanium	I-6	1	<0.050		<0.050	
Total Dissolved Solids (TDS)	I-6	1	850		1,480	
Total Organic Carbon (TOC)	I-6	1	63		25	
Total Solids	I-6	1	11,500		1,500	
Vanadium	I-6	1	<0.050		<0.050	
Yttrium	I-6	1	<0.050		<0.050	
Conventional Pollutants						
Oil and Grease	I-6	1	<1		500	
Total Suspended Solids (TSS)	I-6	1	300		<1	
pH (standard units)	I-6	1	6.10		7.50	

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-43, 45-64, and 66-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-117

PRECIOUS METALS PRESSURE BONDING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	83.50	20.00	0.0	83.50	20.00
Average	83.50	20.00		83.50	20.00

Table V-118

PRECIOUS METALS PRESSURE BONDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	K-2	1	<0.010			<0.010
115. arsenic	K-2	1	<0.010			<0.010
117. beryllium	K-2	1	<0.005			<0.005
118. cadmium	K-2	1	<0.020			0.060
119. chromium	K-2	1	<0.020			0.060
120. copper	K-2	1	0.100			7.85
121. cyanide (total)	K-2	1	0.09			<0.02
122. lead	K-2	1	<0.050			0.250
123. mercury	K-2	1	<0.0002			<0.0002
124. nickel	K-2	1	<0.050			0.400
125. selenium	K-2	1	<0.010			<0.010
126. silver	K-2	1	<0.010			0.050
127. thallium	K-2	1	<0.010			<0.010
128. zinc	K-2	1	<0.020			3.42
Nonconventional Pollutants						
Acidity	K-2	1	<1			<1
Alkalinity	K-2	1	43			52
Aluminum	K-2	1	<0.100			56.3
Ammonia Nitrogen	K-2	1	0.17			0.08
Barium	K-2	1	<0.050			0.100
Boron	K-2	1	<0.100			0.100
Calcium	K-2	1	8.70			15.4

Table V-118 (Continued)

PRECIOUS METALS PRESSURE BONDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	K-2	1	34			42
Chloride	K-2	1	35			38
Cobalt	K-2	1	<0.050			<0.050
Fluoride	K-2	1	1.31			1.4
Iron	K-2	1	<0.050			29.4
Magnesium	K-2	1	2.10			55.4
Manganese	K-2	1	<0.050			1.00
Molybdenum	K-2	1	<0.050			<0.050
Phenolics	K-2	1	<0.005			<0.005
Phosphate	K-2	1	4.8			11
Sodium	K-2	1	32.9			36.6
Sulfate	K-2	1	400			780
Tin	K-2	1	<0.050			0.100
Titanium	K-2	1	<0.050			0.100
Total Dissolved Solids (TDS)	K-2	1	140			140
Total Organic Carbon (TOC)	K-2	1	<1			<1
Total Solids (TS)	K-2	1	160			150
Vanadium	K-2	1	<0.050			<0.050
Yttrium	K-2	1	<0.050			<0.050

Table V-118 (Continued)

PRECIOUS METALS PRESSURE BONDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	K-2	1	<1			10
Total Suspended Solids (TSS)	K-2	1	16			4
pH (standard units)	K-2	1	6.70			7.90

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-119

PRECIOUS METALS WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge L/kkg	Wastewater Discharge gal/ton
1	47,500	11,400	100	0.00	0.00
2	NR	NR	100	0.00	0.00
3	NR	NR	P	NR	NR
4	NR	NR	NR	NR	NR
2	NR	NR	NR	NR	NR
Average	47,500	11,400		0.00	0.00

P - Periodic discharge
NR - Data not reported

Table V-120

REFRACTORY METALS
ROLLING SPENT NEAT OILS AND GRAPHITE-BASED LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	100	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-121

REFRACTORY METALS ROLLING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	P	428.8	102.8
Average	NR	NR		428.8	102.8

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-122

REFRACTORY METALS DRAWING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	100	0.00	0.00
3	NR	NR	NR	0.00	0.00
4	NR	NR	NR	0.00	0.00
5	NR	NR	100	0.00	0.00
5	NR	NR	100	0.00	0.00
6	NR	NR	NR	NR	NR
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-123

REFRACTORY METALS EXTRUSION SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	0.00	0.09
2	NR	NR	0.0	0.00	0.00
3	NR	NR	0.0	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-124

REFRACTORY METALS EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	1,190	285.4	0.0	1,190	285.4
Average	1,190	285.4		1,190	285.4

*Discharge from operation.

Table V-125

REFRACTORY METALS EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	N-2	1	ND			0.745
23. chloroform	N-2	1	0.015			ND
24. 2-chlorophenol	N-2	1	ND			<0.010
44. methylene chloride	N-2	1	ND			0.980
58. 4-nitrophenol	N-2	1	0.010			ND
65. phenol	N-2	1	ND			0.418
66. bis(2-ethylhexyl) phthalate	N-2	1	<0.010			286
67. butyl benzyl phthalate	N-2	1	ND			1,040
68. di-n-butyl phthalate	N-2	1	ND			1.683
69. di-n-octyl phthalate	N-2	1	ND			265
70. diethyl phthalate	N-2	1	ND			2.340
72. benzo(a)anthracene (a)	N-2	1	ND			455
76. chrysene(a)	N-2	1	ND			455
85. tetrachloroethylene	N-2	1	ND			26.3
86. toluene	N-2	1	ND			0.110
114. antimony	N-2	1	<0.002			0.060
115. arsenic	N-2	1	<0.001			<0.001
117. beryllium	N-2	1	<0.0005			0.003
118. cadmium	N-2	1	<0.001			0.32
119. chromium (total)	N-2	1	0.10			0.60
120. copper	N-2	1	0.030			21
122. lead	N-2	1	0.084			18

Table V-125 (Continued)

REFRACTORY METALS EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	N-2	1	<0.0002			<0.0002
124. nickel	N-2	1	0.11			0.44
125. selenium	N-2	1	<0.008			<0.008
126. silver	N-2	1	<0.002			0.32
127. thallium	N-2	1	<0.001			<0.001
128. zinc	N-2	1	0.20			18
Nonconventional Pollutants						
Molybdenum	N-2	1	0.10			20
Total Dissolved Solids (TDS)	N-2	1	360			350,000
Conventional Pollutants						
Oil and Grease	N-2	1	14			44,000
Total Suspended Solids (TSS)	N-2	1	<1			19,000
pH(standard units)	N-2	1	7.4			8.5

(a) Reported together

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-22, 25-43, 45-57, 59-64, 71, 73-75, 77-84, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, 121, and 129.

Table V-126

REFRACTORY METALS FORGING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	2.23	0.54	0.0	0.00	0.00
1	6.75	1.62	0.0	0.00	0.00
2	NR	NR	0.0	0.00	0.00
3	NR	NR	0.0	0.00	0.00
Average	4.49	1.08		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-127

REFRACTORY METALS FORGING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	323	77.5	0.0	323	77.5
1	NR	NR	0.0	NR	NR
Average	323	77.5		323	77.5

NR - Data not reported

*Discharge from operation.

Table V-128

REFRACTORY METALS METAL POWDER PRODUCTION WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	1,183	283.7	0.0	0.00	0.00
1	280.6	67.29	0.0	0.00	0.00
2	37.11	8.90	0.0	36.02	8.64
1	151.9	36.43	0.0	151.9	36.43
3	34,450	8,262	0.0	34,450	8,262
Average	7,221	1,732		11,550	2,769

*Discharge from operation.

Table V-129

REFRACTORY METALS METAL POWDER PRODUCTION FLOOR WASHWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	183.4	43.99	100	0.00	0.00
2	35.83	8.59	0.0	35.83	8.59
Average	109.6	26.29		35.83	8.59

*Discharge from operation.

Table V-130

REFRACTORY METALS METAL POWDER PRESSING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-131

REFRACTORY METALS SURFACE TREATMENT SPENT BATHS

Plant	Wastewater Discharge* L/kkg	gal/ton
1	13.09	3.14
2	94.12	22.57
3	232.3	55.71
4	343.9	82.47
2	469.8	112.7
5	1,180	282.9
6	NR	NR
7	NR	NR
8	NR	NR
6	NR	NR
7	NR	NR
2	NR	NR
6	NR	NR
9	NR	NR
10	NR	NR
Average	388.8	93.25

NR - Data not reported

*Discharge from operation.

Table V-132

REFRACTORY METALS SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	M-6	1	<0.010		<0.050	
115. arsenic	M-6	1	<0.010		<0.010	
117. beryllium	M-6	1	<0.005		<0.005	
118. cadmium	M-6	1	<0.020		0.500	
119. chromium (total)	M-6	1	<0.020		0.100	
120. copper	M-6	1	<0.050		6.30	
121. cyanide (total)	M-6	1	<0.02		<0.02	
122. lead	M-6	1	<0.050		<0.100	
123. mercury	M-6	1	<0.0002		0.0002	
124. nickel	M-6	1	<0.050		12.4	
125. selenium	M-6	1	<0.010		<0.010	
126. silver	M-6	1	<0.010		6.10	
127. thallium	M-6	1	<0.010		<0.100	
128. zinc	M-6	1	0.080		1.75	
Nonconventional Pollutants						
Acidity	M-6	1	<1		1,900	
Alkalinity	M-6	1	100		<1	
Aluminum	M-6	1	0.200		0.400	
Ammonia Nitrogen	M-6	1	<0.1		<0.1	
Barium	M-6	1	<0.050		<0.050	
Boron	M-6	1	<0.100		9.00	
Calcium	M-6	1	36.5		39.1	

Table V-132 (Continued)

REFRACTORY METALS SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	M-6	1	<5		1,800	
Chloride	M-6	1	10		100	
Cobalt	M-6	1	<0.050		<0.050	
Fluoride	M-6	1	0.85		0.27	
Iron	M-6	1	<0.050		14.7	
Magnesium	M-6	1	11.3		13.2	
Manganese	M-6	1	<0.050		0.150	
Molybdenum	M-6	1	<0.050		0.050	
Phenolics	M-6	1	<0.005		<0.005	
Phosphate	M-6	1	<4		<4	
Sodium	M-6	1	5.20		60.1	
Sulfate	M-6	1	43		61	
Tin	M-6	1	<0.050		<0.050	
Titanium	M-6	1	<0.050		0.050	
Total Dissolved Solids (TDS)	M-6	1	270		660	
Total Organic Carbon (TOC)	M-6	1	<1		12	
Total Solids (TS)	M-6	1	280		1,300	
Vanadium	M-6	1	<0.050		<0.050	
Yttrium	M-6	1	<0.050		<0.050	

Table V-132 (Continued)

REFRACTORY METALS SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	M-6	1	3		<1	
Total Suspended Solids (TSS)	M-6	1	14		140	
pH (standard units)	M-6	1	7.30		0.80	

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-133

REFRACTORY METALS SURFACE TREATMENT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	5,949	1,427	0.0	5,949	1,427
2	NR	NR	CCR	9,381	2,250
3	9,673	2,320	0.0	9,673	2,320
4	24,570	5,893	0.0	24,570	5,893
2	NR	NR	CCR	27,970	6,707
5	444,800	106,700	0.0	444,800	106,700
6	NR	NR	NR	NR	NR
6	NR	NR	NR	NR	NR
7	NR	NR	P	NR	NR
6	NR	NR	0.0	NR	NR
8	NR	NR	NR	NR	NR
9	NR	NR	0.0	NR	NR
10	NR	NR	NR	NR	NR
2	NR	NR	NR	NR	NR
Average	121,200	29,090		87,060	20,880

P - Periodic discharge
NR - Data not reported
CCR - Two stage countercurrent rinsing in-place

*Discharge from operation.

Table V-134

REFRACTORY METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	M-7	1	<0.010		<0.010	
	M-10	1	<0.010		<0.100	
	O-2	2	<0.10			<0.1
	Z-1	1	0.0004	0.00025		
115. arsenic	M-7	1	<0.010		<0.010	
	M-10	1	<0.010		<0.010	
	O-2	2	<0.01			<0.01
	Z-1	1	<0.001	0.0018		
117. beryllium	M-7	1	<0.005		<0.005	
	M-10	1	<0.005		<0.200	
	O-2	2	<0.001			0.004
	Z-1	1	<0.01	<0.01		
118. cadmium	M-7	1	<0.020		<0.020	
	M-10	1	<0.020		<0.040	
	O-2	2	<0.002			0.040
	Z-1	1	<0.01	0.03		
119. chromium (total)	M-7	1	<0.020		<0.020	
	M-10	1	<0.020		0.440	
	O-2	2	<0.005			0.100
	Z-1	1	0.038	0.11		
120. copper	M-7	1	<0.050		0.050	
	M-10	1	<0.050		0.400	
	O-2	2	0.030			0.200
	Z-1	1	0.013	0.12		
121. cyanide (total)	M-7	1	<0.02		<0.02	
	M-10	1	<0.02		<0.02	
122. lead	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		0.500	
	O-2	2	<0.020			0.060
	Z-1	1	0.097	0.16		

Table V-134 (Continued)

REFRACTORY METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	M-7	1	<0.0002		<0.0002	
	M-10	1	<0.0002		<0.0002	
	O-2	2	<0.0001			0.0001
	Z-1	1	<0.005	<0.005		
124. nickel	M-7	1	<0.050		0.600	
	M-10	1	<0.050		10.2	
	O-2	2	<0.005			0.070
	Z-1	1	0.038	0.086		
125. selenium	M-7	1	<0.010		<0.010	
	M-10	1	<0.010		<0.010	
	O-2	2	<0.01			<0.01
	Z-1	1	0.0004	<0.0004		
126. silver	M-7	1	<0.010		0.050	
	M-10	1	<0.010		<0.010	
	O-2	2	<0.02			<0.02
	Z-1	1	0.0005	0.0005		
127. thallium	M-7	1	<0.010		<0.050	
	M-10	1	<0.010		<0.010	
	O-2	2	<0.1			<0.2
	Z-1	1	<0.001	<0.001		
128. zinc	M-7	1	0.080		0.040	
	M-10	1	0.080		0.080	
	O-2	2	<0.060			0.200
	Z-1	1	<0.25	0.034		

Table V-134 (Continued)

REFRACTORY METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	M-7	1	<1		1,500	
	M-10	1	<1		890	
	Z-1	1	<10	1,200		
Alkalinity	M-7	1	100		<1	
	M-10	1	100		<1	
	Z-1	1	69	<10		
Aluminum	M-7	1	0.200		0.200	
	M-10	1	0.200		19.6	
	O-2	2	<0.050			<0.500
	Z-1	1	0.11	0.46		
Ammonia Nitrogen	M-7	1	<0.1		<0.1	
Barium	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		0.100	
	O-2	2	0.020			0.040
	Z-1	1	0.04	0.012		
Boron	M-7	1	<0.100		0.100	
	M-10	1	<0.100		46.4	
	Z-1	1	0.5	0.97		
Calcium	M-7	1	36.5		33.8	
	M-10	1	36.5		37.6	
	O-2	2	<5.0			<5.0
	Z-1	1	79	5		
Chemical Oxygen Demand (COD)	M-7	1	<5		<5	
	O-2	2	8			114
Chloride	M-7	1	10		930	
	M-10	1	10		12	
	O-2	2				12

Table V-134 (Continued)

REFRACTORY METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Cobalt	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		<1.00	
	Z-1	1	<0.01	<0.01		
Columbium	Z-1	1	ND	4.4		
Fluoride	M-7	1	0.85		1.1	
	M-10	1	0.85		3,000	
	O-2	2				5.2
	Z-1	1	0.2	82		
Iron	M-7	1	<0.050		0.300	
	M-10	1	<0.050		2.00	
	O-2	2	<0.200			5.00
	Z-1	1	0.24	0.72		
Magnesium	M-7	1	11.3		10.7	
	M-10	1	11.3		11.8	
	O-2	2	0.7			0.9
	Z-1	1	8.0	0.034		
Manganese	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		<0.100	
	O-2	2	<0.005			0.080
	Z-1	1	0.012	0.03		
Molybdenum	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		0.700	
	O-2	2	<0.005			0.400
	Z-1	1	<0.03	<0.03		

Table V-134 (Continued)

REFRACTORY METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phenolics	M-7	1	<0.005		<0.005	
Phosphate	M-7	1	<4		<4	
Sodium	M-7	1	5.20		7.60	
	M-10	1	5.20		36.8	
	O-2	2	<15			27
	Z-1	1	27	43		
Sulfate	M-7	1	43		44	
	M-10	1	43		380	
Tantalum	Z-1	1	ND	9.2		
Tin	M-7	1	<0.050		<0.100	
	M-10	1	<0.050		<1.00	
	O-2	2	<0.005			0.010
	Z-1	1	<0.28	<0.28		
Titanium	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		<0.100	
	O-2	2	<0.020			0.020
	Z-1	1	<0.25	2		
Total Dissolved Solids (TDS)	M-7	1	270		270	
	M-10	1	270		770	
	Z-1	1	110	87		
Total Organic Carbon (TOC)	M-7	1	<1		9	
	O-2	2	6			46
Total Solids (TS)	M-7	1	280		330	
	M-10	1	280		980	
	Z-1	1	390	390		

Table V-134 (Continued)

REFRACTORY METALS SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		<0.100	
	O-2	2	<0.010			0.020
	Z-1	1	<0.02	0.031		
Yttrium	M-7	1	<0.050		<0.050	
	M-10	1	<0.050		<0.100	
	O-2	2	<0.020			<0.020
	Z-1	1	<0.25	<0.25		
Zirconium	Z-1	1	0.26	0.64		
Conventional Pollutants						
Oil and Grease	M-7	1	3		<1	
	O-2	1				6
Total Suspended Solids (TSS)	M-7	1	14		120	
	M-10	1	14		140	
	O-2	2	<1			52
	Z-1	1	100	15		
pH (standard units)	M-7	1	7.30		1.50	
	M-10	1	7.30		2.10	
	Z-1	1	6	2		

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-135

REFRACTORY METALS ALKALINE CLEANING SPENT BATHS

Plant	Wastewater Discharge* L/kkg	gal/ton
1	95.00	22.80
2	435.6	104.5
3	472.0	113.2
4	NR	NR
5	NR	NR
6	NR	NR
7	NR	NR
8	NR	NR
9	NR	NR
10	NR	NR
11	NR	NR
10	NR	NR
12	NR	NR
13	NR	NR
Average	334.2	80.15

NR - Data not reported

*Discharge from operation.

Table V-136

REFRACTORY METALS ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	Z-3	1	0.0004	0.00028		
115. arsenic	Z-3	1	<0.001	0.016		
117. beryllium	Z-3	1	<0.01	0.036		
118. cadmium	Z-3	1	<0.01	0.02		
119. chromium (total)	Z-3	1	0.038	0.75		
120. copper	Z-3	1	0.013	0.96		
122. lead	Z-3	1	0.097	9.9		
123. mercury	Z-3	1	<0.005	<0.005		
124. nickel	Z-3	1	0.038	0.65		
125. selenium	Z-3	1	0.0004	0.0011		
126. silver	Z-3	1	0.0005	0.0055		
127. thallium	Z-3	1	<0.001	0.0028		
128. zinc	Z-3	1	<0.25	<1.6		
Nonconventional Pollutants						
Acidity	Z-3	1	<10	<10		
Alkalinity	Z-3	1	69	>9,500		
Aluminum	Z-3	1	0.11	17		
Barium	Z-3	1	0.04	0.35		
Boron	Z-3	1	0.5	170		
Calcium	Z-3	1	79	180		
Cobalt	Z-3	1	<0.01	0.036		
Columbium	Z-3	1	ND	865		

Table V-136 (Continued)

REFRACTORY METALS ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Fluoride	Z-3	1	0.2	41		
Iron	Z-3	1	0.24	8.5		
Magnesium	Z-3	1	8.0	4.1		
Manganese	Z-3	1	0.012	0.18		
Molybdenum	Z-3	1	<0.03	0.7		
Sodium	Z-3	1	27	31,000		
Tantalum	Z-3	1	ND	585		
Tin	Z-3	1	<0.28	<0.28		
Titanium	Z-3	1	<0.25	6.5		
Total Dissolved Solids (TDS)	Z-3	1	110	200.0		
Total Solids (TS)	Z-3	1	390	295.0		
Vanadium	Z-3	1	<0.02	0.37		
Yttrium	Z-3	1	<0.25	<0.25		
Zirconium	Z-3	1	0.26	8.5		
Conventional Pollutants						
Oil and Grease	Z-3	1	<1	13		
Total Suspended Solids (TSS)	Z-3	1	100	54.0		
pH (standard units)	Z-3	1	6	14		

1. No analyses were performed on the following toxic pollutants: 1-113, 116, 121, and 129.

Table V-137

REFRACTORY METALS ALKALINE CLEANING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	9,874	2,368	0.0	9,874	2,368
1	20,910	5,014	0.0	20,910	5,014
2	33,860	8,119	0.0	33,860	8,119
3	36,730	8,807	0.0	36,730	8,807
4	43,220	10,370	0.0	43,220	10,370
5	103,000	24,700	0.0	103,000	24,700
6	226,100	54,210	0.0	226,100	54,210
7	240,200	57,600	0.0	240,200	57,600
6	909,400	218,100	0.0	909,400	218,100
7	2,102,000	504,000	0.0	2,102,000	504,000
7	5,254,000	1,260,000	0.0	5,254,000	1,260,000
8	NR	NR	NR	NR	NR
9	NR	NR	P	NR	NR
10	NR	NR	0.0	NR	NR
11	NR	NR	NR	NR	NR
12	NR	NR	0.0	NR	NR
13	NR	NR	0.0	NR	NR
14	NR	NR	NR	NR	NR
Average	816,300	195,800		816,300	195,800

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-138

REFRACTORY METALS MOLTEN SALT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	52.13	12.50	0.0	52.13	12.50
2	1,830	438.8	0.0	1,830	438.8
3	3,739	896.7	0.0	3,739	896.7
3	5,594	1,341	0.0	5,594	1,341
4	20,416	4,896	0.0	20,416	4,896
5	NR	NR	NR	NR	NR
Average	6,326	1,517		6,326	1,517

NR - Data not reported

*Discharge from operation.

Table V-139

REFRACTORY METALS MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	N-3	1	ND		<0.010	
23. chloroform	N-3	1	0.015		<0.010	
44. methylene chloride	N-3	1	ND		<0.010	
58. 4-nitrophenol	N-3	3	0.010		ND	
66. bis(2-ethylhexyl) phthalate	N-3	3	<0.010		ND	
85. tetrachloroethylene	N-3	1	ND		0.017	
104. gamma-BHC	N-3	3	<0.005		ND	
114. antimony	M-4	1	<0.010	<0.050	<0.040	<0.050
	M-9	1	<0.010			<0.010
	N-3	3	<0.002		0.003	
	Z-4	1	0.0004	<0.00025		
115. arsenic	M-4	1	<0.010	<0.020	<0.020	<0.020
	M-9	1	<0.010			<0.020
	N-3	3	<0.001		<0.001	
	Z-4	1	<0.001	<0.001		
117. beryllium	M-4	1	<0.005	<0.010	<0.010	<0.010
	M-9	1	<0.005			<0.005
	N-3	3	<0.0005		<0.0005	
	Z-4	1	<0.01	0.022		
118. cadmium	M-4	1	<0.020	<0.050	<0.050	<0.050
	M-9	1	<0.020			<0.020
	N-3	3	<0.001		<0.001	
	Z-4	1	<0.01	<0.01		
119. chromium (total)	M-4	1	<0.020	<0.050	0.400	0.400
	M-9	1	<0.020			0.020
	N-3	3	0.10		0.095	
	Z-4	1	0.038	0.059		
120. copper	M-4	1	<0.050	<0.050	0.050	0.050
	M-9	1	<0.050			<0.050
	N-3	1	0.030		0.035	
	Z-4	1	0.013	0.023		

Table V-139 (Continued)

REFRACTORY METALS MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
121. cyanide (total)	M-4	1	<0.02	<0.02	<0.02	<0.02
	M-9	1	<0.02			<0.02
	N-3	1	0.003		<0.001	
122. lead	M-4	1	<0.050	<0.100	<0.100	<0.100
	M-9	1	<0.050			0.050
	N-3	3	0.084		0.070	
	Z-4	1	0.097	0.21		
123. mercury	M-4	1	<0.0002	<0.0002	<0.0002	<0.0002
	M-9	1	<0.0002			<0.0002
	N-3	3	<0.0002		<0.0002	
	Z-4	1	<0.005	<0.005		
124. nickel	M-4	1	<0.050	<0.200	<0.200	<0.200
	M-9	1	<0.050			<0.050
	N-3	3	0.11		0.016	
	Z-4	1	0.038	0.43		
125. selenium	M-4	1	<0.010	<0.020	<0.020	<0.020
	M-9	1	<0.010			<0.020
	N-3	3	<0.008		<0.008	
	Z-4	1	0.0004	<0.0004		
126. silver	M-4	1	<0.010	0.040	0.020	0.026
	M-9	1	<0.010			<0.020
	N-3	3	<0.002		<0.002	
	Z-4	1	0.0005	<0.0005		
127. thallium	M-4	1	<0.010	<0.010	<0.010	<0.050
	N-3	3	<0.001		<0.001	
	Z-4	1	<0.001	<0.001		
128. zinc	M-4	1	0.080	0.150	<0.500	<1.00
	M-9	1	0.080			0.020
	N-3	3	0.20		0.10	
	Z-4	1	<0.25	0.034		

Table V-139 (Continued)

REFRACTORY METALS MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	M-4	1	<1	<1	<1	<1
	M-9	1	<1			<1
	Z-4	1	<10	27		
Alkalinity	M-4	1	100	21,900	26,000	690
	M-9	1	100			1,940
	Z-4	1	69	3		
Aluminum	M-4	1	0.200	<10.0	2.00	3.00
	M-9	1	0.200			0.100
	Z-4	1	0.11	0.23		
Ammonia Nitrogen	M-4	1	<0.1	<0.1	<0.1	0.22
	M-9	1	<0.1			<0.1
Barium	M-4	1	<0.050	<5.00	<0.500	<0.500
	M-9	1	<0.050			<0.050
	Z-4	1	0.04	0.052		
Boron	M-4	1	<0.100	10.0	5.00	6.00
	M-9	1	<0.100			<0.100
	Z-4	1	0.5	0.3		
Calcium	M-4	1	36.5	<10.0	1.00	1.00
	M-9	1	36.5			20.7
	Z-4	1	79	8.6		
Chemical Oxygen Demand (COD)	M-4	1	<5	120	110	100
	M-9	1	<5			<5
Chloride	M-4	1	10	110	21	120
	M-9	1	10			14
Cobalt	M-4	1	<0.050	<5.00	<0.500	<0.500
	M-9	1	<0.050			<0.050
	Z-4	1	<0.01	<0.01		
Columbium	Z-4	1	ND	2.3		
Fluoride	M-4	1	0.85	1.7	0.65	0.67
	M-9	1	0.85			0.82
	Z-4	1	0.2	18		

Table V-139 (Continued)

REFRACTORY METALS MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	M-4	1	<0.050	<5.00	<0.500	<0.500
	M-9	1	<0.050			0.550
	Z-4	1	0.24	1		
Magnesium	M-4	1	11.3	<10.0	<1.00	<1.00
	M-9	1	11.3			5.10
	Z-4	1	8.0	0.39		
Manganese	M-4	1	<0.050	<5.00	<0.500	<0.500
	M-9	1	<0.050			<0.050
	Z-4	1	0.012	0.12		
Molybdenum	M-4	1	<0.050	<5.00	<1.00	0.500
	M-9	1	<0.050			<0.050
	N-3	3	0.10		5.2	
	Z-4	1	<0.03	<0.03		
Phenolics	M-4	1	<0.005	0.007	0.005	<0.005
	M-9	1	<0.005			<0.005
	N-3	1	0.0017		0.00062	
Phosphate	M-4	1	<4	21	<4	24
	M-9	1	<4			<4
Sodium	M-4	1	5.20	9,340	8,010	9,400
	M-9	1	5.20			806
	Z-4	1	27	300		
Sulfate	M-4	1	43	46	43	57
	M-9	1	43			36
Tantalum	Z-4	1	ND	2.5		
Tin	M-4	1	<0.050	<5.00	<2.00	<5.00
	M-9	1	<0.050			<0.200
	Z-4	1	<0.28	<0.28		
Titanium	M-4	1	<0.050	<5.00	<0.500	<0.500
	M-9	1	<0.050			<0.050
	Z-4	1	<0.25	<0.25		

Table V-139 (Continued)

REFRACTORY METALS MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Dissolved Solids (TDS)	M-4	1	270	20,000	19,000	22,000
	M-9	1	270			2,500
	N-3	3	360		490	
	Z-4	1	110	107.0		
Total Organic Carbon (TOC)	M-4	1	<1	50	22	18
	M-9	1	<1			70
Total Solids (TS)	M-4	1	280	3,000	24,000	33,000
	M-9	1	280			2,500
	Z-4	1	390	178.0		
Vanadium	M-4	1	<0.050	<5.00	<0.500	<0.500
	M-9	1	<0.050			<0.050
	Z-4	1	<0.02	<0.02		
Yttrium	M-4	1	<0.050	<5.00	<0.500	<0.500
	M-9	1	<0.050			<0.050
	Z-4	1	<0.25	<0.25		
Zirconium	Z-4	1	0.26	<0.13		

Table V-139 (Continued)

REFRACTORY METALS MOLTEN SALT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	M-4	1	3	<1	<1	<1
	M-9	1	3			<1
Total Suspended Solids (TSS)	M-4	1	14	540	240	130
	M-9	1	14			230
	N-3	1	14		<1	
	Z-4	1	100	80.0		
pH (standard units)	M-4	1	7.30	11.80	11.90	11.80
	M-9	1	7.30			11.80
	N-3	3	<1		8.0	
	Z-4	1	6	6		

1. Toxic pollutants 89-113 were analyzed in this waste stream.

2. The following toxic pollutants were not detected in this waste stream: 1-10, 12-22, 24-43, 45-57, 59-65, 67-84, 86-103, and 105-113.

3. No analyses were performed on the following toxic pollutants: 116 and 129.

Table V-140

REFRACTORY METALS TUMBLING OR BURNISHING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	952.7	228.5	0.0	952.7	228.5
2	992.8	238.1	0.0	992.8	238.1
3	1,359	325.9	0.0	1,359	325.9
2	5,745	1,378	0.0	5,745	1,378
4	19,300	4,628	0.0	19,300	4,628
2	65,010	15,590	0.0	65,010	15,590
5	599,300	143,700	0.0	599,300	143,700
5	666,100	159,700	0.0	666,100	159,700
6	NR	NR	NR	NR	NR
7	NR	NR	NR	NR	NR
Average	169,800	40,720		169,800	40,720

NR - Data not reported

*Discharge from operation.

Table V-141

REFRACTORY METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	M-2	1	0.011	0.011	0.011	0.015
	M-3	1	0.011			0.017
	M-13	1	0.011			0.018
23. chloroform	M-2	1	0.016	ND	ND	ND
	M-3	1	0.016			0.007
	M-13	1	0.016			0.006
44. methylene chloride	M-2	1	0.001	0.002	0.002	0.002
	M-3	1	0.001			0.008
	M-13	1	0.001			0.004
55. naphthalene	M-2	1	ND	ND	0.002	ND
	M-3	2	ND			ND
	M-13	1	ND			ND
66. bis(2-ethylhexyl) phthalate	M-2	1	ND	ND	0.001	0.002
	M-3	2	ND			ND
	M-13	1	ND			0.014
114. antimony	M-2	1	<0.010	<0.010	<0.010	<0.010
	M-3	1	<0.010			<0.010
	M-13	1	<0.010			<0.010
115. arsenic	M-2	1	<0.010	<0.010	<0.010	<0.010
	M-3	2	<0.010			<0.010
	M-13	1	<0.010			<0.010
117. beryllium	M-2	1	<0.005	<0.005	<0.005	<0.005
	M-3	2	<0.005			<0.005
	M-13	1	<0.005			<0.010
118. cadmium	M-2	1	<0.020	<0.020	0.120	0.060
	M-3	2	<0.020			0.140
	M-13	1	<0.020			0.040
119. chromium (total)	M-2	1	<0.030	0.020	0.780	0.380
	M-3	2	<0.020			0.060
	M-13	1	<0.020			0.520

Table V-141 (Continued)

REFRACTORY METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
120. copper	M-2	1	<0.050	1.90	8.65	3.95
	M-3	2	<0.050			2.15
	M-13	1	<0.050			<0.100
121. cyanide (total)	M-2	1	<0.02	<0.02	<0.02	<0.02
	M-3	1	<0.02			<0.02
	M-13	1	<0.02			<0.02
122. lead	M-2	1	<0.050	<0.500	<10.0	<5.00
	M-3	2	<0.050			<1.00
	M-13	1	<0.050			<10.0
123. mercury	M-2	1	<0.0002	<0.0002	<0.0002	<0.0002
	M-3	2	<0.0002			<0.0002
	M-13	1	<0.0002			<0.0002
124. nickel	M-2	1	<0.050	0.750	23.7	16.0
	M-3	2	<0.050			103
	M-13	1	<0.050			<0.100
125. selenium	M-2	1	<0.010	<0.010	<0.010	<0.010
	M-3	2	<0.010			<0.010
	M-13	1	<0.010			<0.010
126. silver	M-2	1	<0.010	0.140	0.220	0.150
	M-3	2	<0.010			0.140
	M-13	1	<0.010			<0.010
127. thallium	M-2	1	<0.010	<0.010	<0.010	<0.010
	M-3	2	<0.010			<0.010
	M-13	1	<0.010			<0.010
128. zinc	M-2	1	0.080	0.060	<0.500	<0.500
	M-3	2	0.080			0.520
	M-13	1	0.080			<0.500

Table V-141 (Continued)

REFRACTORY METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	M-2	1	<1	<1	<1	<1
	M-3	2	<1			<1
	M-13	1	<1			<1
Alkalinity	M-2	1	100	100	41	85
	M-3	2	100			1,260
	M-13	1	100			190
Aluminum	M-2	1	0.200	0.500	23.4	16.7
	M-3	2	0.200			3.10
	M-13	1	0.200			21.6
Ammonia Nitrogen	M-2	1	<0.1	<0.1	1.6	0.41
	M-3	2	<0.1			0.3
	M-13	1	<0.1			<0.1
Barium	M-2	1	<0.050	<0.050	0.400	0.200
	M-3	2	<0.050			0.050
	M-13	1	<0.050			0.100
Boron	M-2	1	<0.100	<0.100	1.70	8.20
	M-3	2	<0.100			1.60
	M-13	1	<0.100			0.500
Calcium	M-2	1	36.5	35.3	43.5	41.2
	M-3	2	36.5			36.5
	M-13	1	36.5			41.0
Chemical Oxygen Demand (COD)	M-2	1	<5	<5	11	<5
	M-3	2	<5			120
	M-13	1	<5			<5
Chloride	M-2	1	10	7.1	17	14
	M-3	2	10			13
	M-13	1	10			28

Table V-141 (Continued)

REFRACTORY METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Cobalt	M-2	1	<0.050	<0.050	0.100	0.050
	M-3	2	<0.050			0.050
	M-13	1	<0.050			0.100
Fluoride	M-2	1	0.85	2.2	0.86	0.79
	M-3	2	0.85			1.0
	M-13	1	0.85			0.78
Iron	M-2	1	<0.050	0.800	15.1	8.05
	M-3	2	<0.050			17.6
	M-13	1	<0.050			4.60
Magnesium	M-2	1	11.3	11.1	13.6	12.7
	M-3	2	11.3			11.6
	M-13	1	11.3			13.4
Manganese	M-2	1	<0.050	0.050	0.750	0.350
	M-3	2	<0.050			0.300
	M-13	1	<0.050			0.200
Molybdenum	M-2	1	<0.050	0.400	4.45	0.950
	M-3	2	<0.050			<0.050
	M-13	1	<0.050			<0.500
Phenolics	M-2	1	<0.005	<0.005	0.007	<0.005
	M-3	1	<0.005			<0.005
	M-13	1	<0.005			<0.005
Phosphate	M-2	1	<4	12	29	23
	M-3	2	<4			120
	M-13	1	<4			17

Table V-141 (Continued)

REFRACTORY METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sodium	M-2	1	5.20	6.80	18.5	19.3
	M-3	2	5.20			561
	M-13	1	5.20			65.6
Sulfate	M-2	1	43	45	62	49
	M-3	2	43			130
	M-13	1	43			65
Tin	M-2	1	<0.050	<0.100	<0.500	<0.500
	M-3	2	<0.050			<0.500
	M-13	1	<0.050			<0.500
Titanium	M-2	1	<0.050	0.050	0.950	0.550
	M-3	2	<0.050			1.55
	M-13	1	<0.050			3.80
Total Dissolved Solids (TDS)	M-2	1	270	200	1,500	1,600
	M-3	2	270			1,900
	M-13	1	270			530
Total Organic Carbon (TOC)	M-2	1	<1	17	15	4
	M-3	2	<1			75
	M-13	1	<1			22
Total Solids (TS)	M-2	1	280	390	3,100	3,500
	M-3	2	280			3,000
	M-13	1	280			3,200
Vanadium	M-2	1	<0.050	<0.050	0.800	0.350
	M-3	2	<0.050			<0.050
	M-13	1	<0.050			<0.100

Table V-141 (Continued)

REFRACTORY METALS TUMBLING OR BURNISHING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Yttrium	M-2	1	<0.050	<0.050	<0.050	<0.050
	M-3	2	<0.050			<0.050
	M-13	1	<0.050			<0.100
Conventional Pollutants						
Oil and Grease	M-2	1	3	<1	<1	<1
	M-3	1	3			13
	M-13	1	3			1.3
Total Suspended Solids (TSS)	M-2	1	14	200	2,700	2,700
	M-3	2	14			1,300
	M-13	1	14			2,400
pH (standard units)	M-2	1	7.30	8.30	5.30	6.40
	M-3	2	7.30			10.00
	M-13	1	7.30			6.60

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-22, 24-43, 45-54, 56-65, and 67-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-142

REFRACTORY METALS SAWING OR GRINDING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	P	17.07	4.09
2	NR	NR	P	564.4	135.4
3	NR	NR	NR	NR	NR
Average	NR	NR		290.7	69.72

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-143

REFRACTORY METALS SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	NR	0.00	0.00
2	168.8	40.47	100	0.00	0.00
1	NR	NR	NR	0.00	0.00
1	NR	NR	NR	0.00	0.00
3	NR	NR	P	2.17	0.52
3	NR	NR	P	20.85	5.00
4	136.6	32.75	0.0	136.6	32.75
1	NR	NR	P	1,027	246.3
5	NR	NR	P	NR	NR
6	NR	NR	P	NR	NR
7	NR	NR	NR	NR	NR
7	NR	NR	NR	NR	NR
7	NR	NR	NR	NR	NR
5	NR	NR	P	NR	NR
5	NR	NR	P	NR	NR
8	NR	NR	NR	NR	NR
Average	152.7	36.6		296.6	71.14

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-144

REFRACTORY METALS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	BG-1	1	-	<0.002		
	BQ-1		-	<0.010		
118. cadmium	BG-1	1	-	<0.001		
	BQ-1		-	<0.010		
119. chromium (total)	BG-1	1	-	0.030		
	BQ-1		-	<0.010		
120. copper	BG-1	1	-	<0.100		
	BQ-1		-	1.5		
121. cyanide	BG-1	1	-	0.020		
	BQ-1		-	0.38		
122. lead	BG-1	1	-	<0.010		
	BQ-1		-	<0.010		
124. nickel	BG-1	1	-	0.200		
	BQ-1		-	2.000		
128. zinc	BG-1	1	-	0.030		
	BQ-1		-	0.400		
Nonconventional Pollutants						
Fluoride	BG-1	1	-	2.60		
	BQ-1		-	11.50		
Molybdenum	BG-1	1	-	<0.03		

Table V-144 (Continued)

REFRACTORY METALS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Tungsten	BQ-1		-	<1.0		
	BG-1	1	-	390.0		
Conventional Pollutants						
Oil and Grease	BQ-1		-	47.000		
Total Suspended Solids (TSS)	BQ-1		-	486.000		
	BG-1			5.000		
pH	BQ-1		-	8.67		

1. No analyses were performed on the following toxic pollutants: 1-116, 123 and 125-127.

Table V-145

REFRACTORY METALS SAWING OR GRINDING
CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100	0.00	0.00
1	NR	NR	100	0.00	0.00
1	NR	NR	100	0.00	0.00
2	NR	NR	P	135.5	32.49
3	6,255	1,500	0.0	6,255	1,500
4	9,621	2,307	0.0	9,621	2,307
5	56,890	13,640	80.0	11,380	2,729
2	24,390	5,848	0.0	24,390	5,848
6	119,100	28,570	0.0	119,100	28,570
Average	43,250	10,370		28,480	6,831

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-146

REFRACTORY METALS SAWING OR GRINDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	M-12	1	0.011			0.017
	N-4	1	ND		0.177	
15. 1,1,2,2-tetrachloroethane	M-12	1	ND			ND
	N-4	1	ND		<0.010	
23. chloroform	M-12	1	0.016			ND
	N-4	1	0.015		ND	
29. 1,1-dichloroethylene	M-12	1	ND			ND
	N-4	1	ND		<0.010	
34. 2,4-dimethylphenol	M-12	1	ND			0.013
	N-4	1	ND		ND	
39. fluoranthene	M-12	1	ND			ND
	N-4	1	ND		<0.010	
44. methylene chloride	M-12	1	0.002			0.005
	N-4	1	ND		<0.010	
55. naphthalene	M-12	1	ND			0.005
	N-4	1	ND		ND	
57. 2-nitrophenol	M-12	1	ND			ND
	N-4	1	ND		0.071	
58. 4-nitrophenol	M-12	1	ND			ND
	N-4	1	0.010		ND	
63. N-nitrosodi-n-propylamine	M-12	1	ND			ND
	N-4	1	ND		0.213	
65. phenol	M-12	1	ND			0.058
	N-4	1	ND		0.034	
66. bis(2-ethylhexyl) phthalate	M-12	1	ND			0.001
	N-4	1	<0.010		<0.010	
68. di-n-butyl phthalate	M-12	1	ND			ND
	N-4	1	ND		<0.010	
69. di-n-octyl phthalate	M-12	1	ND			ND
	N-4	1	ND		<0.010	

Table V-146 (Continued)

REFRACTORY METALS SAWING OR GRINDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
78. anthracene	M-12	1	ND			ND
	N-4	1	ND		<0.010	
84. pyrene	M-12	1	ND			ND
	N-4	1	ND		<0.010	
104. gamma-BHC	N-4	1	<0.005		ND	
114. antimony	M-12	1	<0.010			<0.010
	N-4	1	<0.002		0.040	
115. arsenic	M-12	1	<0.010			<0.010
	N-4	1	<0.001		0.016	
117. beryllium	M-12	1	<0.005			<0.005
	N-4	1	<0.0005		<0.0005	
118. cadmium	M-12	1	<0.020			0.020
	N-4	1	<0.001		0.040	
119. chromium (total)	M-12	1	<0.020			0.080
	N-4	1	0.10		0.86	
120. copper	M-12	1	<0.050			0.050
	N-4	1	0.030		0.21	
121. cyanide (total)	M-12	1	<0.02			<0.02
	N-4	1	0.003		2.0	
122. lead	M-12	1	<0.050			<1.00
	N-4	1	0.084		0.35	
123. mercury	M-12	1	<0.0002			<0.0002
	N-4	1	<0.0002		0.0003	
124. nickel	M-12	1	<0.050			<0.050
	N-4	1	<0.11		1.0	
125. selenium	M-12	1	<0.010			<0.010
	N-4	1	<0.008		<0.008	
126. silver	M-12	1	<0.010			<0.010
	N-4	1	<0.002		<0.002	

Table V-146 (Continued)

REFRACTORY METALS SAWING OR GRINDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
127. thallium	M-12	1	<0.010			<0.010
	N-4	1	<0.001		0.007	
128. zinc	M-12	1	<0.010			0.240
	N-4	1	0.20		0.90	
Nonconventional Pollutants						
Acidity	M-12	1	<1			<1
Alkalinity	M-12	1	100			56
Aluminum	M-12	1	0.200			1.20
Ammonia Nitrogen	M-12	1	<0.1			0.50
Barium	M-12	1	<0.050			<0.050
Boron	M-12	1	<0.100			<0.100
Calcium	M-12	1	36.5			78.2
Chemical Oxygen Demand (COD)	M-12	1	<5			58
Chloride	M-12	1	10			35
Cobalt	M-12	1	<0.050			<0.050
Fluoride	M-12	1	0.85			1.5
Iron	M-12	1	<0.050			13.0
Magnesium	M-12	1	11.3			12.1
Manganese	M-12	1	<0.050			0.050
Molybdenum	M-12	1	<0.050			<0.100
	N-4	1	0.10		5,470	
Phenolics	M-12	1	<0.005			<0.005
	N-4	1	0.0017		0.019	

Table V-146 (Continued)

REFRACTORY METALS SAWING OR GRINDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phosphate	M-12	1	<4			<4
Sodium	M-12	1	5.20			6.00
Sulfate	M-12	1	43			200
Tin	M-12	1	<0.050			<0.200
Titanium	M-12	1	<0.050			0.050
Total Dissolved Solids (TDS)	M-12	1	270			580
	N-4	1	360		25,000	
Total Organic Carbon (TOC)	M-12	1	<1			4
Total Solids (TS)	M-12	1	280			1,200
Vanadium	M-12	1	<0.050			<0.050
Yttrium	M-12	1	<0.050			<0.050
Conventional Pollutants						
Oil and Grease	M-12	1	3			2.9
	N-4	1	14		7.3	
Total Suspended Solids (TSS)	M-12	1	14			380
	N-4	1	<1		240	
pH (standard units)	M-12	1	7.30			6.40
	N-4	1	7.4		5.7	

1. Toxic pollutants 89-113 were analyzed in this waste stream.

2. The following toxic pollutants were not detected in this waste stream: 1-10, 12-14, 16-22, 24-28, 30-33, 35-38, 40-43, 45-54, 56, 59-62, 64, 67, 70-77, 79-83, 85-103, and 105-113.

3. No analyses were performed on the following toxic pollutants: 116 and 129.

Table V-147

REFRACTORY METALS SAWING OR GRINDING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	135	32.5	0.0	135	32.5
1	NR	NR	0.0	NR	NR
Average	135	32.5		135	32.5

NR - Data not reported

*Discharge from operation.

Table V-148

REFRACTORY METALS DYE PENETRANT TESTING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	77.6	18.6	0.0	77.6	18.6
Average	77.6	18.6		77.6	18.6

*Discharge from operation.

Table V-149

REFRACTORY METALS DYE PENETRANT TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	N-5	1	ND		0.170	
13. 1,1-dichloroethane	N-5	1	ND		<0.010	
23. chloroform	N-5	1	0.015		<0.010	
29. 1,1-dichloroethylene	N-5	1	ND		<0.010	
35. 2,4-dinitrotoluene	N-5	1	ND		0.143	
39. fluoranthene	N-5	1	ND		0.284	
44. methylene chloride	N-5	1	ND		<0.010	
55. naphthalene	N-5	1	ND		0.134	
56. nitrobenzene	N-5	1	ND		0.019	
58. 4-nitrophenol	N-5	1	0.010		ND	
60. 4,6-dinitro-o-cresol	N-5	1	ND		0.039	
62. N-nitrosodiphenylamine	N-5	1	ND		0.039	
65. phenol	N-5	1	ND		0.049	
66. bis(2-ethylhexyl) phthalate	N-5	1	<0.010		0.019	
69. di-n-octyl phthalate	N-5	1	ND		<0.010	
77. acenaphthylene	N-5	1	ND		0.021	
78. anthracene (a)	N-5	1	ND		0.049	
80. fluorene	N-5	1	ND		0.021	
81. phenanthrene (a)	N-5	1	ND		0.049	
85. tetrachloroethylene	N-5	1	ND		<0.010	
95. alpha-endosulfan	N-5	1	ND		**	
104. gamma-BHC	N-5	1	<0.005		<0.005	

Table V-149 (Continued)

REFRACTORY METALS DYE PENETRANT TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
114. antimony	N-5	1	<0.002		<0.002	
115. arsenic	N-5	1	<0.001		<0.001	
117. beryllium	N-5	1	<0.0005		<0.0005	
118. cadmium	N-5	1	<0.001		<0.001	
119. chromium (total)	N-5	1	0.10		3.7	
120. copper	N-5	1	0.030		0.28	
121. cyanide (total)	N-5	1	0.003		<0.001	
122. lead	N-5	1	0.084		0.055	
123. mercury	N-5	1	<0.0002		<0.0002	
124. nickel	N-5	1	0.11		1.6	
125. selenium	N-5	1	<0.008		<0.008	
126. silver	N-5	1	<0.002		<0.002	
127. thallium	N-5	1	<0.001		<0.001	
128. zinc	N-5	1	0.20		1.2	
Nonconventional Pollutants						
Molybdenum	N-5	1	0.10		0.50	
Phenolics	N-5	1	0.0017		0.025	
Total Dissolved Solids (TDS)	N-5	1	360		440	

Table V-149 (Continued)

REFRACTORY METALS DYE PENETRANT TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	N-5	1	14		72	
Total Suspended Solids (TSS)	N-5	1	<1		22	
pH (standard units)	N-5	1	7.4		7.5	

(a) Reported together.

**Present, but not quantifiable.

1. Toxic pollutants 89-113 were analyzed in this waste stream.

2. The following toxic pollutants were not detected in this waste stream: 1-10, 12, 14-22, 24-28, 30-34, 36-38, 40-43, 45-54, 57, 59, 61, 63, 64, 67, 68, 70-76, 79, 82-84, 86-94, 96-103, and 105-113.

3. No analyses were performed on the following toxic pollutants: 116 and 129.

Table V-150

REFRACTORY METALS EQUIPMENT CLEANING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	32.36	7.76	100	0.0	0.0
1	13.9	3.34	0.0	13.9	3.34
1	66.1	15.8	0.0	66.1	15.8
2	2,673	641.0	0.0	2,673	641.0
2	2,687	644.2	0.0	2,687	644.3
3	21,140	5,070	0.0	21,140	5,070
Average	4,435	1,064		5,316	1,275

*Discharge from operation.

Table V-151

REFRACTORY METALS EQUIPMENT CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	BG-2	1	-	<0.002		
118. cadmium	BG-2	1	-	0.001		
119. chromium (total)	BG-2	1	-	0.070		
120. copper	BG-2	1	-	1.400		
121. cyanide	BG-2	1	-	0.340		
122. lead	BG-2	1	-	0.600		
124. nickel	BG-2	1	-	0.050		
128. Zinc	BG-2	1	-	0.500		
Nonconventional Pollutants						
Fluoride	BG-2	1	-	2.600		
Molybdenum	BG-2	1	-	<0.03		

Table V-151 (Continued)

REFRACTORY METALS EQUIPMENT CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Tungsten	BG-2	1	-	2.40		
Conventional Pollutants						
Oil and Grease	BG-2	1	-	5.00		
Total Suspended Solids (TSS)	BG-2	1	-	64.00		

1. No analyses were performed on the following toxic pollutants: 1-116, 123 and 125-127.

Table V-152

REFRACTORY METALS MISCELLANEOUS WASTEWATER SOURCES

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100	0.00	0.00
2	3,459	829.6	0	3,459	829.6
3	NR	NR	NR	NR	NR
Average	3,459	829.6		3,459	829.6

NR - Data not reported

*Discharge from operation.

Table V-153

REFRACTORY METALS WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	P	8.32	2.00
1	14,330	3,436	93.2	977.8	234.5
3	2,622	628.8	0.0	2,622	628.8
4	6,672	1,600	0.0	6,672	1,600
5	2,502,000	600,000	0.0	2,502,000	600,000
6	NR	NR	0.0	NR	NR
7	NR	NR	0.0	NR	NR
8	NR	NR	P	NR	NR
Average	631,400	151,400		502,500	120,500

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-154

REFRACTORY METALS WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	M-11	1	0.011		0.010	
23. chloroform	M-11	1	0.016		ND	
44. methylene chloride	M-11	1	0.002		0.003	
114. antimony	M-11	1	<0.010		0.020	
	Z-2	1	0.0004	0.0005		
115. arsenic	M-11	1	<0.010		<0.010	
	Z-2	1	<0.001	0.0061		
117. beryllium	M-11	1	<0.005		<0.005	
	Z-2	1	<0.01	<0.01		
118. cadmium	M-11	1	<0.020		<0.020	
	Z-2	1	<0.01	<0.01		
119. chromium (total)	M-11	1	<0.020		<0.020	
	Z-2	1	0.038	0.044		
120. copper	M-11	1	<0.050		0.050	
	Z-2	1	0.013	0.024		
121. cyanide (total)	M-11	1	<0.02		<0.02	
122. lead	M-11	1	<0.050		<0.050	
	Z-2	1	0.097	0.16		
123. mercury	M-11	1	<0.0002		<0.0002	
	Z-2	1	<0.005	<0.005		
124. nickel	M-11	1	<0.050		<0.050	
	Z-2	1	0.038	0.042		
125. selenium	M-11	1	<0.010		<0.010	
	Z-2	1	0.0004	0.0058		
126. silver	M-11	1	<0.010		<0.010	
	Z-2	1	0.0005	0.0073		
127. thallium	M-11	1	<0.010		<0.010	
	Z-2	1	<0.001	0.0071		

Table V-154 (Continued)

REFRACTORY METALS WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
128. zinc	M-11	1	0.080		0.120	
	Z-2	1	<0.25	0.046		
Nonconventional Pollutants						
Acidity	M-11	1	<1		<1	
	Z-2	1	<10	<10		
Alkalinity	M-11	1	100		80	
	Z-2	1	69	4,400		
Aluminum	M-11	1	0.200		0.300	
	Z-2	1	0.11	5.7		
Ammonia Nitrogen	M-11	1	<0.1		0.67	
Barium	M-11	1	<0.050		<0.050	
	Z-2	1	0.04	0.02		
Boron	M-11	1	<0.100		0.200	
	Z-2	1	0.5	18		
Calcium	M-11	1	36.5		29.9	
	Z2	1	79	3.5		
Chemical Oxygen Demand (COD)	M-11	1	<5		47	
Chloride	M-11	1	10		17	
Cobalt	M-11	1	<0.050		<0.050	
	Z-2	1	<0.01	<0.01		
Columbium	Z-2	1	ND	ND		
Fluoride	M-11	1	0.85		130	
	Z-2	1	0.2	1,050		
Iron	M-11	1	<0.050		0.150	
	Z-2	1	0.24	0.8		
Magnesium	M-11	1	11.3		14.6	
	Z-2	1	8.0	0.35		

Table V-154 (Continued)

REFRACTORY METALS WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	M-11	1	<0.050		<0.050	
	Z-2	1	0.012	0.11		
Molybdenum	M-11	1	<0.050		<0.050	
	Z-2	1	<0.03	<0.03		
Phenolics	M-11	1	<0.005		<0.005	
Phosphate	M-11	1	<4		<4	
Sodium	M-11	1	5.20		154	
	Z-2	1	27	7,600		
Sulfate	M-11	1	43		41	
Tantalum	Z-2	1	ND	ND		
Tin	M-11	1	<0.050		<0.100	
	Z-2	1	<0.28	<0.28		
Titanium	M-11	1	<0.050		<0.050	
	Z-2	1	<0.25	<0.25		
Total Dissolved Solids (TDS)	M-11	1	270		540	
	Z-2	1	110	170		
Total Organic Carbon (TOC)	M-11	1	<1		50	
Total Solids (TS)	M-11	1	280		780	
	Z-2	1	390	200		
Vanadium	M-11	1	<0.050		<0.050	
	Z-2	1	<0.02	<0.02		
Yttrium	M-11	1	<0.050		<0.050	
	Z-2	1	<0.25	<0.25		
Zirconium	Z-2	1	0.26	1.1		

Table V-154 (Continued)

REFRACTORY METALS WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	M-11	1	3		<1	
Total Suspended Solids (TSS)	M-11	1	14		150	
	Z-2	1	100	20		
pH (standard units)	M-11	1	7.30		6.60	
	Z-2	1	6	12		

1. The following toxic pollutants were not detected in this waste stream: 1-10, 12-22, 24-43, and 45-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-155

TITANIUM ROLLING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100	0.00	0.00
2	NR	NR	NR	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-156

TITANIUM ROLLING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	NR	NR
2	4,884	1,171	0.0	4,884	1,171
3	NR	NR	P	NR	NR
4	NR	NR	100	NR	NR
Average	4,884	1,171		4,884	1,171

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-157

TITANIUM DRAWING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	NR	NR	NR
2	NR	NR	NR	NR	NR
Average	NR	NR		NR	NR

NR - Data not reported

*Discharge from operation.

Table V-158

TITANIUM EXTRUSION SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	NR	0.00	0.00
2	NR	NR	0.0	0.00	0.00
3	NR	NR	0.0	0.00	0.00
4	3.56	0.85	0.0	0.00	0.00
5	NR	NR	NR	0.00	0.00
Average	3.56	0.85		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-159

TITANIUM EXTRUSION SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	71.90	17.20	0.0	71.90	17.20
Average	71.90	17.20		71.90	17.20

*Discharge from operation.

Table V-160

TITANIUM EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	178.3	42.77	0.0	178.3	42.77
Average	178.3	42.77		178.3	42.77

*Discharge from operation.

Table V-161

TITANIUM EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Fluoride	AK-1	3	-	2.30		
Conventional Pollutants						
Oil and Grease	AK-1	3	-	10.0		
Total Suspended Solids (TSS)	AK-1	3	-	7.0		
pH	AK-1	3	-	6.8		

Table V-162

TITANIUM FORGING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	2.10	0.50	0.0	0.00	0.00
2	NR	NR	0.0	0.00	0.00
1	6.80	1.63	0.0	0.00	0.00
3	NR	NR	0.0	0.00	0.00
4	NR	NR	NR	0.00	0.00
5	NR	NR	0.0	0.00	0.00
6	339.4	81.37	0.0	0.00	0.00
7	NR	NR	NR	NR	NR
Average	116.1	27.83		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-163

TITANIUM FORGING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	5,252	1,259	95.0	245.1	58.77
2	417.0	100.0	0.0	417.0	100.0
3	323	77.5	0.0	323	77.5
4	NR	NR	NR	NR	NR
Average	1,997	479.0		328.4	78.76

NR - Data not reported

*Discharge from operation.

Table V-164

TITANIUM FORGING EQUIPMENT CLEANING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	13.92	3.34	0.0	13.92	3.34
1	66.10	15.86	0.0	66.10	15.86
Average	40.01	9.60		40.01	9.60

*Discharge from operation.

Table V-165

TITANIUM FORGING PRESS HYDRAULIC FLUID LEAKAGE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	1,010	242.3	0.0	1,010	242.3
2	NR	NR	NR	NR	NR
Average	1,010	242.3		1,010	242.3

NR - Data not reported

*Discharge from operation.

Table V-166

TITANIUM TUBE REDUCING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	2,356	565.0	0.0	294.3	70.57
2	1,050	251.9	0.0	1,050	251.9
3	7,359	1,765	0.0	7,359	1,765
2	NR	NR	NR	NR	NR
Average	3,588	860.6		2,901	695.7

NR - Data not reported

*Discharge from operation.

Table V-167

TITANIUM TUBE REDUCING SPENT LUBRICANT
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. Beryllium	AX-1	1	-	<0.1		
118. Cadmium	AX-1	1	-	<0.1		
119. Chromium (total)	AX-1	1	-	<0.5		
120. Copper	AX-1	1	-	4.800		
121. Cyanide	AX-1	1	-	<0.800		
122. Lead	AX-1	1	-	<0.5		
124. Nickel	AX-1	1	-	<0.5		
128. Zinc	AX-1	1	-	10.000		
Nonconventional Pollutants						
Aluminum	AX-1	1	-	<2.000		
Ammonia (as N)	AX-1	1	-	<0.5		
Flouride	AX-1	1	-	1.570		
Iron	AX-1	1	-	46.800		
Titanium	AX-1	1	-	65.400		
Vanadium	AX-1	1	-	2.500		
Conventional Pollutants						
Oil and Grease	AX-1	1	-	4,937.0		
Total Suspended Solids (TSS)	AX-1	1	-	14,150.0		
pH	AX-1	1		7.8		

1. No analyses were performed for the following toxic pollutants: 1-116, 123 and 125-127.

Table V-168

TITANIUM HEAT TREATMENT CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	110,840	26,580	99.9	13.58	3.26
2	NR	NR	NR	19.25	4.62
3	214.3	51.40	0.0	214.3	51.40
4	1,747	418.9	0.0	1,747	418.9
5	2,067	495.7	0.0	2,067	495.7
6	3,233	775.4	0.0	3,233	775.4
7	12,530	3,006	0.0	12,530	3,006
8	23,070	5,531	0.0	23,070	5,531
9	NR	NR	0.0	NR	NR
10	NR	NR	NR	NR	NR
Average	21,957	5,265		5,362	1,286

NR - Data not reported

*Discharge from operation.

Table V-169

TITANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AK-2	3	-	<0.020		
	AW-1	1	-	<0.100		
	BW-2		-	0.006		
	BK-2		-	<0.001		
118. cadmium	AK-2	3	-	<0.010		
	AW-1	1	-	<0.050		
	BW-2		-	0.033		
	BK-2		-	<0.005		
119. chromium (total)	AK-2	3	-	<0.020		
	AW-1	1	-	<0.010		
	BW-2		-	0.460		
	BK-2		-	0.010		
120. copper	AK-2	3	-	0.420		
	AW-1	1	-	<0.050		
	BW-2		-	11.000		
	BK-2		-	0.033		
121. cyanide	AW-1	1	-	0.036		
122. lead	AK-2	3	-	<0.020		
	AW-1	1	-	<0.100		
	BW-2		-	0.510		
	BK-2		-	<0.050		
124. nickel	AK-2	3	-	<0.020		
	AW-1	1	-	0.100		
	BW-2		-	1.300		
	BK-2		-	0.360		
128. zinc	AK-2	3	-	0.170		
	AW-1	1	-	<0.050		
	BW-2		-	6.700		
	BK-2		-	0.008		

Table V-169 (Continued)

TITANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
aluminum	AW-1	1	-	<1.00		
	BW-2		-	24.00		
	BK-2		-	0.096		
ammonia	AW-1	1	-	<0.100		
cobalt	BW-2		-	0.330		
	BK-2		-	0.009		
flouride	AW-1	1	-	1.200		
iron	AW-1	1	-	0.340		
	BW-2		-	440.0		
	BK-2		-	0.960		
magnesium	BW-2		-	14.00		
	BK-2		-	7.80		
manganese	BW-2		-	6.400		
	BK-2		-	0.017		
molybdenum	BW-2			0.450		
	BK-2			0.069		
titanium	AK-2	3	-	<0.050		
	AW-1	1	-	2.000		
	BW-2		-	0.810		
	BK-2		-	0.012		
vanadium	AW-1	1	-	<0.200		
	BW-2		-	0.600		
	BK-2		-	0.061		
zirconium	AK-2	3	-	<0.100		

Table V-169 (Continued)

TITANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
oil and Grease	AW-1	1	-	1.10		
total Suspended Solids (TSS)	AW-1	1	-	390.0		
pH	AW-1	1	-	7.4		

1. No analyses were performed on the following toxic pollutants: 1-116, 123 and 125-127.

Table V-170

TITANIUM SURFACE TREATMENT SPENT BATHS

Plant	Wastewater L/kkg	Discharge* gal/ton
1	0.00	0.00
2	7.15	1.71
3	9.13	2.19
4	27.73	6.65
5	37.23	8.93
6	39.89	9.57
7	50.73	12.17
8	52.29	12.54
9	100.1	24.00
10	103.3	24.78
5	111.2	26.67
11	208.0	49.88
12	219.4	52.62
10	239.7	57.47
13	255.4	61.25
14	492.3	118.1
11	500.8	120.1
10	694.8	166.6
14	881.9	211.5
15	1,187	284.6
16	2,502	600.0
14	5,466	1,311
11	NR	NR
17	NR	NR
18	NR	NR
11	NR	NR
19	NR	NR
11	NR	NR
20	NR	NR
21	NR	NR
22	NR	NR
21	NR	NR
Average	599.4	143.7

NR - Data not reported

*Discharge from operation.

Table V-171

TITANIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA*

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	L-2	1	<0.010		<0.10	
	L-4	1	<0.010			0.30
115. arsenic	L-2	1	<0.010		1.60	
	L-4	1	<0.010			1.80
117. beryllium	L-2	1	<0.005		<5.00	
	L-4	1	<0.005			<5.00
118. cadmium	L-2	1	<0.020		<2.00	
	L-4	1	<0.020			<0.20
119. chromium (total)	L-2	1	<0.020		18.0	
	L-4	1	<0.020			12.8
120. copper	L-2	1	<0.050		5.00	
	L-4	1	<0.050			4.00
122. lead	L-2	1	<0.050		65.0	
	L-4	1	<0.050			214
123. mercury	L-2	1	<0.0002		<0.002	
	L-4	1	<0.0002			<0.002
124. nickel	L-2	1	<0.050		5.00	
	L-4	1	<0.050			10.0
125. selenium	L-2	1	<0.100		<1.00	
	L-4	1	<0.100			<1.00
126. silver	L-2	1	<0.010		<0.10	
	L-4	1	<0.010			<0.10

Table V-171 (Continued)

TITANIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA*

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
127. thallium	L-2	1	<0.010		<0.40	
	L-4	1	<0.010			0.20
128. zinc	L-2	1	<0.020		166	
	L-4	1	<0.020			<2.00
Nonconventional Pollutants						
Acidity	L-2	1	<1		4,700	
	L-4	1	<1			9,000
Alkalinity	L-2	1	250		<10	
	L-4	1	250			<10
Aluminum	L-2	1	0.200		5,850	
	L-4	1	0.200			2,490
Barium	L-2	1	0.100		5.00	
	L-4	1	0.100			1.50
Boron	L-2	1	<0.100		40.0	
	L-4	1	<0.100			891
Calcium	L-2	1	77.6		240	
	L-4	1	77.6			48.0
Chloride	L-2	1	50		3,300	
	L-4	1	50			<10
Cobalt	L-2	1	<0.050		110	
	L-4	1	<0.050			41.0
Fluoride	L-2	1	1.1		98,000	
	L-4	1	1.1			74,000

Table V-171 (Continued)

TITANIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA*

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	L-2	1	<0.050	31,200		
	L-4	1	<0.050			2,840
Magnesium	L-2	1	34.0	270		
	L-4	1	34.0			20.0
Manganese	L-2	1	<0.050	50.0		
	L-4	1	<0.050			16.0
Molybdenum	L-2	1	<0.050	495		
	L-4	1	<0.050			126
Sodium	L-2	1	19.6	140		
	L-4	1	19.6			753
Sulfate	L-2	1	21,000	430,000		
	L-4	1	21,000			150
Tin	L-2	1	<0.050	<50.0		
	L-4	1	<0.050			<50.0
Titanium	L-2	1	<0.050	60,300		
	L-4	1	<0.050			27,900
Total Dissolved Solids (TDS)	L-2	1	390	280,000		
	L-4	1	390			150,000
Total Solids (TS)	L-2	1	400	302,000		
	L-4	1	400			151,000

Table V-171 (Continued)

TITANIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA*

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	L-2	1	<0.050		1,150	
	L-4	1	<0.050			757
Yttrium	L-2	1	<0.050		<5.00	
	L-4	1	<0.050			<0.50
Conventional Pollutants						
Total Suspended Solids (TSS)	L-2	1	7		3,360	
	L-4	1	7			480
pH (standard units)	L-2	1	7.61		2.20	
	L-4	1	7.61			1.80

*Sample concentrations for Streams L-2 (Day 2) and L-4 (Day 3) have been adjusted to account for the ten-fold dilution of the sample which was performed on-site at the time of collection.

NA - Not analyzed.

1. No analyses were performed on the following toxic pollutants: 1-113, 116, 121, and 129.

Table V-172

TITANIUM SURFACE TREATMENT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	P	100.1	24.00
2	NR	NR	P	222.8	53.44
3	350.2	84.0	0.0	350.2	83.99
4	1,456	349.2	0.0	1,456	349.2
5	1,769	424.2	0.0	1,769	424.2
6	2,946	706.5	0.0	2,946	706.5
7	3,376	809.5	0.0	3,376	809.5
8	5,752	1,379	0.0	5,752	1,379
9	7,217	1,731	0.0	7,217	1,731
7	7,846	1,881	0.0	7,846	1,881
4	8,530	2,046	0.0	8,530	2,046
10	NR	NR	P	10,878	2,609
7	17,809	4,271	0.0	17,809	4,271
11	NR	NR	P	19,624	4,706
12	33,989	8,151	0.0	33,989	8,151
8	50,040	12,000	0.0	50,040	12,000
13	50,040	12,000	0.0	50,040	12,000
7	110,505	26,500	40.0	66,370	15,916
14	81,740	19,602	0.0	79,521	19,070
7	83,686	20,069	0.0	83,686	20,069
15	444,391	106,569	0.0	444,391	106,569
14	4,969,215	1,191,658	0.0	662,562	158,888
11	971,365	232,941	0.0	971,365	232,941
16	NR	NR	P	NR	NR
17	NR	NR	NR	NR	NR
18	NR	NR	NR	NR	NR
19	NR	NR	NR	NR	NR
20	NR	NR	NR	NR	NR
21	NR	NR	NR	NR	NR
Average	360,633	86,483		109,993	26,377

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-173

TITANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	L-3	6	<0.010	<0.010	<0.010	<0.010
	L-5	6	<0.010	<0.010	<0.010	<0.010
	L-6	1	<0.010	<0.010		
115. arsenic	L-3	6	<0.010	<0.010	<0.010	<0.010
	L-5	6	<0.010	<0.010	<0.010	<0.010
	L-6	1	<0.010	<0.010		
117. beryllium	L-3	6	<0.005	<0.050	<0.005	<0.050
	L-5	6	<0.005	<0.005	<0.005	<0.005
	L-6	1	<0.005	<0.005		
118. cadmium	L-3	6	<0.020	<0.020	<0.020	<0.020
	L-5	6	<0.020	<0.020	<0.020	<0.020
	L-6	1	<0.020	<0.020		
119. chromium (total)	L-3	6	<0.020	0.060	0.020	0.040
	L-5	6	<0.020	<0.020	<0.020	<0.020
	L-6	1	<0.020	0.380		
120. copper	L-3	6	<0.050	0.150	0.050	0.050
	L-5	6	<0.050	<0.050	<0.050	<0.050
	L-6	1	<0.050	0.450		
121. cyanide (total)	L-7	1	<0.03	<0.02		
122. lead	L-3	6	<0.050	0.550	0.400	0.400
	L-5	6	<0.050	0.050	0.200	0.300
	L-6	1	<0.050	5.90		
123. mercury	L-3	6	<0.0002	<0.0002	<0.0002	<0.0002
	L-5	6	<0.0002	<0.0002	<0.0002	<0.0002
	L-6	1	<0.0002	<0.0002		

Table V-173 (Continued)

TITANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
124. nickel	L-3	6	<0.050	<0.050	<0.050	<0.050
	L-5	6	<0.050	<0.050	<0.050	<0.050
	L-6	1	<0.050	0.950		
125. selenium	L-3	6	<0.100	<0.100	<0.100	<0.100
	L-5	6	<0.100	<0.100	<0.100	<0.100
	L-6	1	<0.100	<0.100		
126. silver	L-3	6	<0.010	<0.010	<0.010	<0.010
	L-5	6	<0.010	<0.010	<0.010	<0.010
	L-6	1	<0.010	<0.010		
127. thallium	L-3	6	<0.010	<0.010	<0.020	<0.020
	L-5	6	<0.010	<0.010	<0.010	<0.010
	L-6	1	<0.010	<0.040		
128. zinc	L-3	6	<0.020	0.400	0.120	0.180
	L-5	6	<0.020	0.020	<0.020	<0.020
	L-6	1	<0.020	0.660		
Nonconventional Pollutants						
Acidity	L-3	6	<1	460	460	1,400
	L-5	6	<1	<1	800	1,500
	L-6	1	<1	190		
Alkalinity	L-3	6	250	<1	<1	<1
	L-5	6	250	170	<1	<1
	L-6	1	250	<1		
Aluminum	L-3	6	0.200	17.0	4.30	6.90
	L-5	6	0.200	0.500	1.90	2.90
	L-6	1	0.200	13.8		

Table V-173 (Continued)

TITANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	L-3	6	0.08	18	19	18
	L-5	6	0.08	1.7	13	20
	L-6	1	0.08	52		
Barium	L-3	6	0.100	0.100	0.100	0.100
	L-5	6	0.100	0.100	0.100	0.100
	L-6	1	0.100	0.200		
Boron	L-3	6	<0.100	0.400	0.200	0.400
	L-5	6	<0.100	<0.100	<0.100	0.100
	L-6	1	<0.100	0.700		
Calcium	L-3	6	77.6	71.1	74.6	72.5
	L-5	6	77.6	71.6	74.3	73.2
	L-6	1	77.6	162		
Chemical Oxygen Demand (COD)	L-3	6	<1	3.1	43	25
	L-5	6	<1	<1	31	17
	L-6	1	<1	34		
Chloride	L-3	6	50	47	45	40
	L-5	6	50	45	46	45
	L-6	1	50	94		
Cobalt	L-3	6	<0.050	0.350	0.100	0.150
	L-5	6	<0.050	<0.050	<0.050	0.050
	L-6	1	<0.050	0.100		
Fluoride	L-3	6	1.1	170	130	1.1
	L-5	6	1.1	12	46	1.3
	L-6	1	1.1	215		
Iron	L-3	6	<0.050	75.3	20.4	36.6
	L-5	6	<0.050	0.550	2.35	6.15
	L-6	1	<0.050	119		

Table V-173 (Continued)

TITANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Magnesium	L-3	6	34.0	32.4	33.6	32.1
	L-5	6	34.0	32.7	33.4	32.5
	L-6	1	34.0	72.1		
Manganese	L-3	6	<0.050	0.150	0.050	0.100
	L-5	6	<0.050	<0.050	<0.050	0.050
	L-6	1	<0.050	2.10		
Molybdenum	L-3	6	<0.050	1.60	0.200	0.550
	L-5	6	<0.050	<0.050	0.200	0.200
	L-6	1	<0.050	0.050		
Phosphate	L-3	6	1	3	2.2	<0.5
	L-5	6	1	1	0.5	<0.5
	L-6	1	1	1.9		
Sodium	L-3	6	19.6	55.9	20.1	17.9
	L-5	6	19.6	20.1	19.9	17.9
	L-6	1	19.6	50.2		
Sulfate	L-3	6	21,000	3,500	4,000	460
	L-5	6	21,000	5,400	3,000	760
	L-6	1	21,000	240		
Tin	L-3	6	<0.050	0.050	<0.050	<0.050
	L-5	6	<0.050	0.650	<0.050	<0.050
	L-6	1	<0.050	0.050		
Titanium	L-3	6	<0.050	186	47.9	79.7
	L-5	6	<0.050	3.55	20.3	34.4
	L-6	1	<0.050	15.1		
Total Dissolved Solids (TDS)	L-3	6	390	300	900	660
	L-5	6	390	440	900	640
	L-6	1	390	1,400		

Table V-173 (Continued)

TITANIUM SURFACE TREATMENT RINSE RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Organic Carbon (TOC)	L-3	6	2	4	6	4
	L-5	6	2	4	5	5
	L-6	1	2	15		
Total Solids (TS)	L-3	6	400	370	1,200	740
	L-5	6	400	550	1,011	530
	L-6	1	400	1,540		
Vanadium	L-3	6	<0.050	3.85	1.65	2.30
	L-5	6	<0.050	0.100	0.650	1.10
	L-6	1	<0.050	0.350		
Yttrium	L-3	6	<0.050	<0.050	<0.050	<0.050
	L-5	6	<0.050	<0.050	<0.050	<0.050
	L-6	1	<0.050	<0.050		
Conventional Pollutants						
Total Suspended Solids (TSS)	L-3	6	7	40	66	34
	L-5	6	7	32	39	28
	L-6	1	7	<1		
pH (standard units)	L-3	6	7.61	2.73	2.70	0.53
	L-5	6	7.61	6.90	1.30	0.58
	L-6	1	7.61	3.80		

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

2. Note that stream code Y-4 also appears on the nickel-cobalt surface treatment rinsewater raw wastewter sampling data table. The wastewater is derived from an operation in both subcategories.

Table V-174

TITANIUM ALKALINE CLEANING SPENT BATHS

Plant	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	52.10	12.50
2	57.08	13.69
3	229.9	55.14
4	239.6	57.46
5	1,962	470.6
3	3,679	882.4
5	9,812	2,353
6	NR	NR
Average	2,290	549.2

NR - Data not reported

*Discharge from operation.

Table V-175

TITANIUM ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AQ-1		-	<0.001		
	AX-2		-	<0.100		
	AX-5		-	<0.100		
118. cadmium	AQ-1		-	<0.005		
	AX-2		-	<0.100		
	AX-5		-	<0.100		
119. chromium (total)	AQ-1		-	0.011		
	AX-2		-	<0.500		
	AX-5		-	<0.500		
120. copper	AQ-1		-	0.770		
	AX-2		-	4.300		
	AX-5		-	6.300		
121. cyanide	AX-2		-	0.700		
	AX-5		-	<0.500		
122. lead	AQ-1		-	<0.050		
	AX-2		-	<0.500		
	AX-5		-	<0.500		
124. nickel	AQ-1		-	<0.012		
	AX-2		-	<0.500		
	AX-5		-	<0.500		
128. zinc	AQ-1		-	0.491		
	AX-2		-	<0.100		
	AX-5		-	<0.100		

Table V-175 (Continued)

TITANIUM ALKALINE CLEANING SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Aluminum	AQ-1		-	0.123		
	AX-2		-	<2.00		
	AX-5		-	<2.00		
Ammonia (as N)	AX-2		-	<0.500		
	AX-5		-	<0.500		
Cobalt	AQ-1		-	0.021		
Fluoride	AX-2		-	1.070		
	AX-5		-	0.780		
Iron	AQ-1		-	1.530		
	AX-2		-	5.400		
	AX-5		-	1.900		
Titanium	AQ-1		-	6.500		
	AX-2		-	4.800		
	AX-5		-	<1.100		
Vanadium	AQ-1		-	0.0026		
	AX-2		-	<0.100		
	AX-3		-	<1.00		
Conventional Pollutants						
Oil and Grease	AQ-1		-	720.00		
	AX-2		-	930.00		
	AX-5		-	<2.0		
Total Suspended Solids (TSS)	AX-2		-	400.00		
	AX-5		-	9.00		
pH	AX-2		-	9.5		
	AX-5		-	2.7		

1. No analyses were performed on the following toxic pollutants: 1-116, 123, 125-127 and 129.

Table V-176

TITANIUM ALKALINE CLEANING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	348.0	83.40	0.0	348.0	83.40
2	350.3	84.00	0.0	350.3	84.00
3	5,177	1,241	0.0	5,177	1,241
4	82,320	19,740	0.0	79,290	19,010
5	166,800	40,000	0.0	166,800	40,000
5	314,000	75,290	0.0	314,000	75,290
6	NR	NR	NR	NR	NR
Average	94,830	22,740		94,330	22,620

NR - Data not reported

*Discharge from operation.

Table V-177

TITANIUM ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AQ-2		-	<0.001		
	AX-3	1	-	<0.100		
118. cadmium	AQ-2		-	0.0120		
	AX-3	1	-	<0.100		
119. chromium (Total)	AQ-2		-	<0.003		
	AX-3	1	-	<0.500		
120. copper	AQ-2		-	0.270		
	AX-3	1	-	6.300		
121. cyanide	AX-3	1	-	<0.500		
122. lead	AQ-2		-	0.072		
	AX-3	1	-	ND		
124. nickel	AQ-2		-	<0.012		
	AX-3	1	-	<0.500		
128. zinc	AQ-2		-	0.309		
	AX-3	1	-	ND		
Nonconventional Pollutants						
Aluminum	AQ-2		-	0.113		
	AX-3	1	-	<2.00		
Ammonia	AX-3	1	-	<0.500		
Fluoride	AX-3	1	-	0.990		
Iron	AQ-2			0.536		
	AX-3	1	-	1.900		
Titanium	AQ-2			0.825		
	AX-3	1	-	<1.10		

Table V-177 (Continued)

TITANIUM ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	AX-3	1	-	<2.0		
Total Suspended Solids (TSS)	AX-3	1	-	9.00		
pH	AX-3	1	-	7.4		

1. No analyses were performed on the following toxic pollutants: 1-116, 123, 125-127 and 129.

Table V-178

TITANIUM MOLTEN SALT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	954.9	229.0	0.0	954.9	229.0
Average	954.9	229.0		954.9	229.0

*Discharge from operation.

Table V-179

TITANIUM TUMBLING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	790.0	189.4	0.0	790.0	189.4
Average	790.0	189.4		790.0	189.4

*Discharge from operation.

Table V-180

TITANIUM TUMBLING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	L-9	1	<0.010		0.020	
115. arsenic	L-9	1	<0.010		<0.010	
117. beryllium	L-9	1	<0.005		<0.050	
118. cadmium	L-9	1	<0.020		<0.200	
119. chromium (total)	L-9	1	<0.020		0.400	
120. copper	L-9	1	<0.050		<0.500	
121. cyanide (total)	L-9	1	0.03		4.1	
122. lead	L-9	1	<0.050		22.0	
123. mercury	L-9	1	<0.0002		0.016	
124. nickel	L-9	1	<0.050		1.00	
125. selenium	L-9	1	<0.100		<0.100	
126. silver	L-9	1	<0.010		<0.010	
127. thallium	L-9	1	<0.010		<0.010	
128. zinc	L-9	1	<0.020		0.800	
Nonconventional Pollutants						
Acidity	L-9	1	<1		<1	
Alkalinity	L-9	1	250		2,600	
Aluminum	L-9	1	0.200		182	
Ammonia Nitrogen	L-9	1	0.08		34	
Barium	L-9	1	0.100		1.00	
Boron	L-9	1	<0.100		116	
Calcium	L-9	1	77.6		192	

Table V-180 (Continued)

TITANIUM TUMBLING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	L-9	1	<1		21,000	
Chloride	L-9	1	50		120	
Cobalt	L-9	1	<0.050		<0.500	
Fluoride	L-9	1	1.1		110	
Iron	L-9	1	<0.050		111	
Magnesium	L-9	1	34.0		13.0	
Manganese	L-9	1	<0.050		1.50	
Molybdenum	L-9	1	<0.050		8.00	
Phosphate	L-9	1	1		<1	
Sodium	L-9	1	19.6		2,730	
Sulfate	L-9	1	21,000		900	
Tin	L-9	1	<0.050		12.0	
Titanium	L-9	1	<0.050		156	
Total Dissolved Solids (TDS)	L-9	1	390		18,000	
Total Organic Carbon (TOC)	L-9	1	2		380	
Total Solids (TS)	L-9	1	400		18,000	
Vanadium	L-9	1	<0.050		1.50	
Yttrium	L-9	1	<0.050		<0.500	

Table V-180 (Continued)

TITANIUM TUMBLING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	L-9	1	<1		17	
Total Suspended Solids (TSS)	L-9	1	7		6,800	
pH (standard units)	L-9	1	7.61		10.50	

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-181

TITANIUM SAWING OR GRINDING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	2.36	0.57	0.0	0.00	0.00
2	NR	NR	NR	NR	NR
Average	2.36	0.57		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-182

TITANIUM SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	39.60	9.50	NR	0.00	0.00
1	164.5	39.46	NR	0.00	0.00
2	NR	NR	100	0.00	0.00
3	15,040	3,606	100	0.00	0.00
3	15,030	3,603	100	0.00	0.00
2	NR	NR	100	0.00	0.00
4	NR	NR	NR	0.00	0.00
5	NR	NR	NR	0.00	0.00
6	35,400	8,490	100	21.25	5.10
7	NR	NR	100	27.02	6.48
8	NR	NR	100	75.47	18.10
9	NR	NR	0.0	97.87	23.47
10	NR	NR	100	352.4	84.51
10	NR	NR	0.0	521.3	125.0
11	NR	NR	100	NR	NR
11	NR	NR	100	NR	NR
6	NR	NR	NR	NR	NR
6	NR	NR	NR	NR	NR
11	NR	NR	100	NR	NR
Average	13,140	3,150		182.5	43.78

NR - Data not reported

*Discharge from operation.

Table V-183

TITANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
6. carbon tetrachloride	L-10	1	0.004		0.002	
23. chloroform	L-10	1	0.123		ND	
44. methylene chloride	L-10	1	ND		0.005	
48. dichlorobromomethane	L-10	1	0.023		ND	
51. chlorodibromomethane	L-10	1	0.002		ND	
114. antimony	L-10	1	<0.010		0.010	
115. arsenic	L-10	1	<0.010		<0.010	
117. beryllium	L-10	1	<0.005		<0.050	
118. cadmium	L-10	1	<0.020		<0.200	
119. chromium (total)	L-10	1	<0.020		1.20	
120. copper	L-10	1	<0.050		<0.500	
121. cyanide (total)	L-10	1	0.03		3.8	
122. lead	L-10	1	<0.050		<0.500	

Table V-183 (Continued)

TITANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	L-10	1	<0.0002		<0.0004	
124. nickel	L-10	1	<0.050		9.50	
125. selenium	L-10	1	<0.100		<0.100	
126. silver	L-10	1	<0.010		<0.010	
127. thallium	L-10	1	<0.010		<0.010	
128. zinc	L-10	1	<0.020		0.40	
Nonconventional Pollutants						
Acidity	L-10	1	<1		<1	
Alkalinity	L-10	1	250		2,000	
Aluminum	L-10	1	0.200		33.0	
Ammonia Nitrogen	L-10	1	0.08		3.8	
Barium	L-10	1	0.100		<0.500	

Table V-183 (Continued)

TITANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	L-10	1	<0.100		<1.00	
Calcium	L-10	1	77.6		64.0	
Chemical Oxygen Demand (COD)	L-10	1	<1		24,000	
Chloride	L-10	1	50		130	
Cobalt	L-10	1	<0.050		<0.500	
Fluoride	L-10	1	1.1		110	
Iron	L-10	1	<0.050		17.5	
Magnesium	L-10	1	34.0		44.0	
Manganese	L-10	1	<0.050		<0.500	
Molybdenum	L-10	1	<0.050		18.0	
Phosphate	L-10	1	1		9	
Sodium	L-10	1	19.6		3,130	

Table V-183 (Continued)

TITANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sulfate	L-10	1	21,000		20,000	
Tin	L-10	1	<0.050		<0.500	
Titanium	L-10	1	<0.050		6.00	
Total Dissolved Solids (TDS)	L-10	1	390		11,500	
Total Organic Carbon (TOC)	L-10	1	2		1,400	
Total Solids (TS)	L-10	1	400		14,000	
Vanadium	L-10	1	<0.050		2.50	
Yttrium	L-10		<0.050		<0.500	
Conventional Pollutants						
Oil and Grease	L-10	1	<1		34	
Total Suspended Solids (TSS)	L-10	1	7		244	

Table V-183 (Continued)

TITANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)						
pH (standard units)	L-10	1	7.61		10.30	

1. The following toxic pollutants were not detected in this waste stream: 1-5, 7-22, 24-43, 45-47, 49, 50, and 52-88.

2. Note that stream codes Y-7 and Y-8 also appear on the nickel-cobalt sawing or grinding spent emulsions raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

3. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-184

TITANIUM SAWING OR GRINDING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	4,760	1,141	0.0	4,760	1,141
Average	4,760	1,141		4,760	1,141

*Discharge from operation.

Table V-185

TITANIUM SAWING OR GRINDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	BS-1			<0.001		
118. cadmium	BS-1			<0.005		
119. chromium (total)	BS-1			0.0034		
120. copper	BS-1			0.093		
122. lead	BS-1			<0.050		
124. nickel	BS-1			<0.012		
128. zinc	BS-1			0.009		
Nonconventional Pollutants						
Aluminum	BS-1			1.190		
Cobalt	BS-1			0.0066		
Iron	BS-1			1.340		
Magnesium	BS-1			13.50		
Manganese	BS-1			0.224		
Molybdenum	BS-1			<0.020		
Titanium	BS-1			7.060		
Tin	BS-1			0.222		
Vanadium	BS-1			0.4560		

1. No analyses were performed for the following toxic pollutants: 1-116, 121, 123, 125-127 and 129.

Table V-186

TITANIUM DYE PENETRANT TESTING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	384.6	92.23	0.0	384.6	92.23
2	1,848	443.1	0.0	1,848	443.1
3	NR	NR	NR	NR	NR
3	NR	NR	0.0	NR	NR
3	NR	NR	NR	NR	NR
4	NR	NR	NR	NR	NR
Average	1,116	267.7		1,116	267.7

NR - Data not reported

*Discharge from operation.

Table V-187

TITANIUM HYDROTESTING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	56,240	13,490	0.0	56,240	13,490
Average	56,240	13,490		56,240	13,490

*Discharge from operation.

Table V-188

TITANIUM WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	175.2	42.01	91.0	15.01	3.60
2	88.13	21.14	0.0	88.13	21.14
2	273.5	65.60	0.0	273.5	65.60
3	25,020	6,000	P	285.9	68.57
4	7,660	1,837	95.0	403.3	96.71
2	892.8	214.1	0.0	892.8	214.1
5	1,459	349.9	0.0	1,459	349.9
2	2,146	514.5	0.0	2,146	514.5
6	53,740	12,890	90.0	3,583	859.2
7	85,320	20,460	92.0	6,872	1,648
8	554,300	132,900	95.0	6,929	1,662
9	NR	NR	NR	NR	NR
10	NR	NR	NR	NR	NR
11	NR	NR	NR	NR	NR
Average	66,460	15,940		2,086	500.3

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-189

TITANIUM WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	L-8	1	<0.010		<0.010	
115. arsenic	L-8	1	<0.010		<0.010	
117. beryllium	L-8	1	<0.005		<0.005	
118. cadmium	L-8	1	<0.020		<0.020	
119. chromium (total)	L-8	1	<0.020		<0.020	
120. copper	L-8	1	<0.050		<0.050	
122. lead	L-8	1	<0.050		0.100	
123. mercury	L-8	1	<0.0002		<0.0002	
124. nickel	L-8	1	<0.050		<0.050	
125. selenium	L-8	1	<0.100		<0.100	
126. silver	L-8	1	<0.010		<0.010	
127. thallium	L-8	1	<0.010		<0.010	
128. zinc	L-8	1	<0.020		0.300	

Table V-189 (Continued)

TITANIUM WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	L-8	1	<1		<1	
Alkalinity	L-8	1	250		390	
Aluminum	L-8	1	0.200		0.400	
Ammonia Nitrogen	L-8	1	0.08		0.15	
Barium	L-8	1	0.100		<0.050	
Boron	L-8	1	<0.100		<0.100	
Calcium	L-8	1	77.6		19.8	
Chemical Oxygen Demand (COD)	L-8	1	<1		220	
Chloride	L-8	1	50		55	
Cobalt	L-8	1	<0.050		0.050	
Fluoride	L-8	1	1.1		33	
Iron	L-8	1	<0.050		1.80	
Magnesium	L-8	1	34.0		30.0	
Manganese	L-8	1	<0.050		<0.050	
Molybdenum	L-8	1	<0.050		<0.050	

Table V-189 (Continued)

TITANIUM WET AIR POLLUTION CONTROL BLOWDOWN RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phosphate	L-8	1	1		<2	
Sodium	L-8	1	19.6		253	
Sulfate	L-8	1	21,000		6,000	
Tin	L-8	1	<0.050		<0.050	
Titanium	L-8	1	<0.050		2.75	
Total Dissolved Solids (TDS)	L-8	1	390		720	
Total Organic Carbon (TOC)	L-8	1	2		40	
Total Solids (TS)	L-8	1	400		870	
Vanadium	L-8	1	<0.050		0.100	
Yttrium	L-8	1	<0.050		<0.050	
Conventional Pollutants						
Total Suspended Solids (TSS)	L-8	1	7		40	
pH (standard units)	L-8	1	7.61		9.81	

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

2. Note that stream code Y-5 also appears on the nickel-cobalt wet air pollution control blowdown raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

Table V-190

URANIUM EXTRUSION SPENT LUBRICANTS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	0 (+)	0 (+)

+ - Loss due to evaporation and drag-out

Table V-191

URANIUM EXTRUSION TOOL CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	344	82.5	0	344	82.5

+ - Loss·due to evaporation and drag-out

Table V-192

URANIUM FORGING SPENT LUBRICANTS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	0 (+)	0 (+)

+ - Loss due to evaporation and drag-out

Table V-193

URANIUM HEAT TREATMENT CONTACT COOLING WATER

Plant	Water Use 1/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge 1/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	6.21	1.49
	NR	NR	P	18.6	4.47
	NR	NR	P	69.2	16.6
2	948	227	0	948	227
	2,846	682	0	2,846	682

P - Periodic discharge

Table V-194

URANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	V-14	1	<0.0006			0.0023
	V-15	1	<0.0006			<0.0006
	V-16	1	<0.0006			<0.0006
115. arsenic	V-14	1	<0.001			<0.001
	V-15	1	<0.001			<0.001
	V-16	1	<0.001			<0.001
117. beryllium	V-14	1	0.012			0.017
	V-15	1	0.012			0.014
	V-16	1	0.012			0.013
118. cadmium	V-14	1	<0.03			<0.03
	V-15	1	<0.03			<0.03
	V-16	1	<0.03			<0.03
119. chromium (total)	V-14	1	0.061			0.099
	V-15	1	0.061			<0.03
	V-16	1	0.061			0.051
120. copper	V-14	1	0.088			0.14
	V-15	1	0.088			0.8
	V-16	1	0.088			0.095
121. cyanide (total)	V-14	1	<0.01			<0.01
	V-15	1	<0.01			<0.01
	V-16	1	<0.01			<0.01
122. lead	V-14	1	0.036			14.0
	V-15	1	0.036			0.15
	V-16	1	0.036			4.9
123. mercury	V-14	1	<0.005			<0.005
	V-15	1	<0.005			<0.005
	V-16	1	<0.005			<0.005
124. nickel	V-14	1	0.055			2.3
	V-15	1	0.055			0.055
	V-16	1	0.055			<0.03
125. selenium	V-14	1	<0.001			<0.001
	V-15	1	<0.001			<0.001
	V-16	1	<0.001			<0.001

Table V-194 (Continued)

URANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
126. silver	V-14	1	<0.0005			0.001
	V-15	1	<0.0005			<0.0005
	V-16	1	<0.0005			<0.0005
127. thallium	V-14	1	<0.001			0.0168
	V-15	1	<0.001			<0.001
	V-16	1	<0.001			<0.001
128. zinc	V-14	1	0.101			0.23
	V-15	1	0.101			0.06
	V-16	1	0.101			0.081

Table V-194 (Continued)

URANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	V-14	1	<10.0			270
	V-15	1	<10.0			<10
	V-16	1	<10.0			<10
Alkalinity	V-14	1	33.0			<1
	V-15	1	33.0			62
	V-16	1	33.0			77
Aluminum	V-14	1	0.131			0.5
	V-15	1	0.131			0.14
	V-16	1	0.131			0.3
Ammonia Nitrogen	V-14	1	0.07			27
	V-15	1	0.07			<0.1
	V-16	1	0.07			0.21
Barium	V-14	1	0.2			987.0
	V-15	1	0.2			1.3
	V-16	1	0.2			0.8
Boron	V-14	1	<0.2			0.16
	V-15	1	<0.2			0.077
	V-16	1	<0.2			<0.03
Calcium	V-14	1	0.045			477.0
	V-15	1	0.045			110.0
	V-16	1	0.045			9.8
Chemical Oxygen Demand (COD)	V-14	1	<50.0			40
	V-15	1	<50.0			50
	V-16	1	<50.0			<5
Chloride	V-14	1	36.0			5,300
	V-15	1	36.0			12
	V-16	1	36.0			30
Cobalt	V-14	1	0.044			0.24
	V-15	1	0.044			0.06
	V-16	1	0.044			0.053

Table V-194 (Continued)

URANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Fluoride	V-14	1	0.41			1.8
	V-15	1	0.41			0.35
	V-16	1	0.41			0.9
Iron	V-14	1	0.16			77.0
	V-15	1	0.16			0.4
	V-16	1	0.16			1.6
Magnesium	V-14	1	8.0			8.4
	V-15	1	8.0			0.8
	V-16	1	8.0			10.0
Manganese	V-14	1	0.058			7.2
	V-15	1	0.058			0.2
	V-16	1	0.058			0.2
Molybdenum	V-14	1	<0.03			0.15
	V-15	1	<0.03			0.05
	V-16	1	<0.03			<0.03

Table V-194 (Continued)

URANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Nitrate	V-14	1	<0.09			<0.09
	V-15	1	<0.09			7.9
	V-16	1	<0.09			0.46
Phosphorus	V-14	1	0.5			2.0
	V-15	1	0.5			1.0
	V-16	1	0.5			1.7
Sodium	V-14	1	74.0			45.0
	V-15	1	74.0			120.0
	V-16	1	74.0			183.0
Sulfate	V-14	1	2.8			4.9
	V-15	1	2.8			7.9
	V-16	1	2.8			8.2
Tin	V-14	1	<0.25			0.25
	V-15	1	<0.25			<0.25
	V-16	1	<0.25			<0.25
Titanium	V-14	1	<0.2			0.2
	V-15	1	<0.2			<0.2
	V-16	1	<0.2			<0.2
Total Dissolved Solids (TDS)	V-14	1	300.0			7,800
	V-15	1	300.0			140
	V-16	1	300.0			4,000
Total Organic Carbon (TOC)	V-14	1	<10.0			<1
	V-15	1	<10.0			<1
	V-16	1	<10.0			3
Total Solids (TS)	V-14	1	330.0			7,900
	V-15	1	330.0			86
	V-16	1	330.0			2,000
Uranium	V-14	1	0.89			51.5
	V-15	1	0.89			9.6
	V-16	1	0.89			10.0

Table V-194 (Continued)

URANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	V-14	1	<0.03		0.15	
	V-15	1	<0.03		0.05	
	V-16	1	<0.03		0.045	
Yttrium	V-14	1	<0.1		<0.1	
	V-15	1	<0.1		<0.1	
	V-16	1	<0.1		<0.1	
			Concentrations (nCi/L)			
Gross Alpha	V-14	1	0.014		33.5	
	V-15	1	0.014		6.7	
	V-16	1	0.014		7.8	
Gross Beta	V-14	1	<0.013		66.7	
	V-15	1	<0.013		10.2	
	V-16	1	<0.013		10.3	
Radium-226	V-14	1	<0.0008		<0.0017	
	V-15	1	<0.0008		0.04	
	V-16	1	<0.0008		0.0118	

Table V-194 (Continued)

URANIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	V-14	1	<1.0			71
	V-15	1	<1.0			<1
	V-16	1	<1.0			84
Total Suspended Solids (TSS)	V-14	1	<1.0			100
	V-15	1	<1.0			1
	V-16	1	<1.0			25
pH (standard units)	V-14	1	6			7
	V-15	1	6			7
	V-16	1	6			7

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-195

URANIUM SURFACE TREATMENT SPENT BATHS

Plant	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	27.2	6.52
2	NR	NR
3	NR	NR

Table V-196

URANIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	V-2	1	<0.0006	0.0038		
115. arsenic	V-2	1	<0.001	<0.004		
117. beryllium	V-2	1	0.012	0.7		
118. cadmium	V-2	1	<0.03	0.5		
119. chromium (total)	V-2	1	0.061	0.8		
120. copper	V-2	1	0.088	16.0		
122. lead	V-2	1	0.036	860.0		
123. mercury	V-2	1	<0.005	0.0325		
124. nickel	V-2	1	0.055	3.9		
125. selenium	V-2	1	<0.001	<0.001		
126. silver	V-2	1	<0.0005	0.002		
127. thallium	V-2	1	<0.001	0.0022		
128. zinc	V-2	1	0.101	0.6		
Nonconventional Pollutants						
Aluminum	V-2	1	0.131	430.0		
Barium	V-2	1	0.2	5.8		
Boron	V-2	1	<0.2	3.6		
Calcium	V-2	1	0.045	0.17		
Cobalt	V-2	1	0.044	4.6		
Iron	V-2	1	0.16	17.0		
Magnesium	V-2	1	8.0	0.56		

Table V-196 (Continued)

URANIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	V-2	1	0.058	2.8		
Molybdenum	V-2	1	≤0.03	2.1		
Sodium	V-2	1	74.0	4.5		
Tin	V-2	1	<0.25	0.9		
Titanium	V-2	1	<0.2	7.3		
Vanadium	V-2	1	<0.03	1.8		
Yttrium	V-2	1	<0.1	6.0		

Table V-196 (Continued)

URANIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
pH (standard units)	V-2	1	6	<1		

1. No analyses were performed for the following toxic pollutants: 1-113, 116, 121, and 129.

Table V-197

URANIUM SURFACE TREATMENT RINSE

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	268	64.3	0	268	64.3
2	406	97.5	0	406	97.5

Table V-198

URANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	V-3	1	<0.0006	<0.0006		
	V-4	2	<0.0006		<0.0006	<0.0006
115. arsenic	V-3	1	<0.001	<0.001		
	V-4	2	<0.001		<0.001	<0.001
117. beryllium	V-3	1	0.012	0.7		
	V-4	2	0.012		0.2	0.3
118. cadmium	V-3	1	<0.03	0.4		
	V-4	2	<0.03		0.13	0.25
119. chromium (total)	V-3	1	0.061	0.6		
	V-4	2	0.061		0.17	0.4
120. copper	V-3	1	0.088	12.0		
	V-4	2	0.088		3.0	4.7
121. cyanide (total)	V-3	1	<0.01	<0.1		
	V-4	1	<0.01			0.05
122. lead	V-3	1	0.036	110.0		
	V-4	2	0.036		6.0	14.0
123. mercury	V-3	1	<0.005	<0.005		
	V-4	2	<0.005		<0.005	<0.005
124. nickel	V-3	1	0.055	3.4		
	V-4	2	0.055		0.8	1.7
125. selenium	V-3	1	<0.001	<0.001		
	V-4	2	<0.001		<0.1	0.0015
126. silver	V-3	1	<0.0005	0.0009		
	V-4	2	<0.0005		<0.0005	<0.0005
127. thallium	V-3	1	<0.001	<0.001		
	V-4	2	<0.001		<0.001	<0.001
128. zinc	V-3	1	0.101	0.6		
	V-4	2	0.101		0.8	0.6

Table V-198 (Continued)

URANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventioal Pollutants						
Acidity	V-4	2	<10.0		1,200	3,500
Alkalinity	V-4	2	33.0		<1	<1
Aluminum	V-3	1	0.131	165.0		
	V-4	2	0.131		9.4	2.1
Ammonia Nitrogen	V-3	1	0.07	<0.3		
	V-4	2	0.07		0.68	0.24
Barium	V-3	1	0.2	195.0		
	V-4	2	0.2		3.7	39.0

Table V-198 (Continued)

URANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	V-3	1	<0.2	3.2		
	V-4	2	<0.2		0.7	1.5
Calcium	V-3	1	0.045	120.0		
	V-4	2	0.045		69.0	48.0
Chemical Oxygen Demand (COD)	V-3	1	<50.0	50		
	V-4	2	<50.0		<50	50
Chloride	V-4	2	36.0		33	160
Cobalt	V-3	1	0.044	4.1		
	V-4	2	0.044		1.1	2.3
Fluoride	V-4	2	0.41		0.73	1.5
Iron	V-3	1	0.16	19.0		
	V-4	2	0.16		2.9	20.0
Magnesium	V-3	1	8.0	1.2		
	V-4	2	8.0		110.0	2.4
Manganese	V-3	1	0.058	3.3		
	V-4	2	0.058		1.4	0.073
Molybdenum	V-3	1	<0.03	1.5		
	V-4	2	<0.03		0.6	1.4
Nitrate	V-4	2	<0.09		2,200	4,600
Phosphorus	V-3	1	0.5	3.4		
	V-4	2	0.5		25	60
Sodium	V-3	1	74.0	68.0		
	V-4	2	74.0		21.0	33.0
Sulfate	V-4	2	2.8		17	28
Tin	V-3	1	<0.25	0.8		
	V-4	2	<0.25		<0.2	0.4

Table V-198 (Continued)

URANIUM SURFACE TREATMENT RINSEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	V-3	1	<0.2	21.0		
	V-4	2	<0.2		1.5	7.6
Total Dissolved Solids TDS	V-4	2	300.0		5,600	9,800
Total Organic Carbon (TOC)	V-3	1	<10.0	180		
	V-4	2	<10.0		30	<1
Total Solids (TS)	V-4	2	330.0		6,000	11,000

Table V-198 (Continued)

URANIUM SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional (Continued)						
Uranium	V-3	1	0.89	2,700		
	V-4	2	0.89		900	760
Vanadium	V-3	1	<0.03	140.0		
	V-4	2	<0.03		2.9	5.8
Yttrium	V-3	1	<0.1	2.4		
	V-4	2	<0.1		0.5	0.7
			Concentrations (nCi/L)			
Gross Alpha	V-3	1	0.014	9,920		
	V-4	2	0.014		794	1,960
Gross Beta	V-3	1	<0.013	22,727		
	V-4	2	<0.013		1,150	2,700
Radium-226	V-3	1	<0.0008	0.105		
	V-4	2	<0.0008		0.018	0.00813
			Concentrations (mg/l)			
Conventional Pollutants						
Oil and Grease	V-3	1	<1.0	<1		
	V-4	1	<1.0			10
Total Suspended Solids (TSS)	V-4	2	<1.0		52	430
pH (standard units)	V-3	1	6	<1		
	V-4	2	6		4	4

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-199

URANIUM SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	3.23	0.774
2	NR	NR	P	8.14	1.95
3	NR	NR	P	NR	NR

P - Periodic batch discharge

Table V-200

URANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
23. chloroform	V-6	1	0.103		ND	
81. phenanthrene	V-6	1	ND		32.607	
114. antimony	V-6	1	<0.0006		0.0014	
115. arsenic	V-6	1	<0.001		<0.001	
117. beryllium	V-6	1	0.012		0.028	
118. cadmium	V-6	1	<0.03		0.07	
119. chromium (total)	V-6	1	0.061		0.1	
120. copper	V-6	1	0.088		0.9	
121. cyanide (total)	V-6	1	<0.01		0.03	
122. lead	V-6	1	0.036		7.3	
123. mercury	V-6	1	<0.005		<0.005	
124. nickel	V-6	1	0.055		0.2	
125. selenium	V-6	1	<0.001		0.001	
126. silver	V-6	1	<0.0005		0.0013	
127. thallium	V-6	1	<0.001		0.0018	
128. zinc	V-6	1	0.101		7.5	
Nonconventional Pollutants						
Acidity	V-6	1	<10.0		130	
Alkalinity	V-6	1	33.0		210	
Aluminum	V-6	1	0.131		2.4	
Ammonia Nitrogen	V-6	1	0.07		<0.02	
Barium	V-6	1	0.2		0.2	

Table V-200 (Continued)

URANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	V-6	1	<0.2		0.6	
Calcium	V-6	1	0.045		32.0	
Chemical Oxygen Demand (COD)	V-6	1	<50.0		<50	
Chloride	V-6	1	36.0		260	
Cobalt	V-6	1	0.044		0.2	
Fluoride	V-6	1	0.41		10	
Iron	V-6	1	0.16		14.0	
Magnesium	V-6	1	8.0		23.0	
Manganese	V-6	1	0.058		0.7	
Molybdenum	V-6	1	<0.03		0.15	
Nitrate	V-6	1	<0.09		280	
Phosphorus	V-6	1	0.5		3.3	
Sodium	V-6	1	74.0		750.0	
Sulfate	V-6	1	2.8		31	
Tin	V-6	1	<0.25		<0.25	
Titanium	V-6	1	<0.2		0.5	
Total Organic Carbon (TOC)	V-6	1	<10.0		1,500	
Uranium	V-6	1	0.89		37.5	
Vanadium	V-6	1	<0.03		0.3	
Yttrium	V-6	1	<0.1		<0.1	

Table V-200 (Continued)

URANIUM SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Gross Alpha	V-6	1	0.014*	70.3*		
Gross Beta	V-6	1	<0.013*	176*		
Radium-226	V-6	1	<0.0008*	0.0212*		
Conventional Pollutants						
Oil and Grease	V-6	1	<1.0	7,500		
Total Suspended Solids (TSS)	V-6	1	<1.0	510		
pH (standard units)	V-6	1	6	7-8		

*concentrations are reported in nanocuries/liter

1. The following toxic pollutants were not detected in this waste stream: 1-22, 24-80, and 82-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-201

URANIUM SAWING OR GRINDING CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	1,647	395

Table V-202

URANIUM SAWING OR GRINDING RINSE

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	4.65	1.12

P - Periodic batch discharge

Table V-203

URANIUM AREA CLEANING WASHWATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	1.37	0.33
	NR	NR	P	30.1	7.28
	NR	NR	P	97.2	23.3

Table V-204

URANIUM AREA CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
22. p-chloro-m-cresol	V-8	1	ND	15.031		
	V-18	1	ND		ND	
	V-19	1	ND		ND	
23. chloroform	V-8	1	0.103	ND		
66. bis(2-ethylhexyl) phthalate	V-8	1	ND	4.879		
	V-18	1	ND		0.085	
	V-19	1	ND		0.989	
114. antimony	V-8	1	<0.0006	<0.0006		
	V-18	1	<0.0006		0.0006	
	V-19	1	<0.0006		<0.0006	
115. arsenic	V-8	1	<0.001	0.0013		
	V-18	1	<0.001		0.0055	
	V-19	1	<0.001		0.0028	
117. beryllium	V-8	1	0.012	0.025		
	V-18	1	0.012		0.051	
	V-19	1	0.012		0.051	
118. cadmium	V-8	1	<0.03	0.063		
	V-18	1	<0.03		0.049	
	V-19	1	<0.03		0.064	
119. chromium (total)	V-8	1	0.061	1.5		
	V-18	1	0.061		0.3	
	V-19	1	0.061		0.6	
120. copper	V-8	1	0.088	2.2		
	V-18	1	0.088		1.9	
	V-19	1	0.088		2.3	
121. cyanide (total)	V-8	1	<0.01	0.10		
	V-18	1	<0.01		<0.01	
	V-19	1	<0.01		<0.01	

Table V-204 (Continued)

URANIUM AREA CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
122. lead	V-8	1	0.036	3.4		
	V-18	1	0.036			3.07
	V-19	1	0.036			4.1
123. mercury	V-8	1	<0.005	<0.005		
	V-18	1	<0.005			<0.0005
	V-19	1	<0.005			<0.0005
124. nickel	V-8	1	0.055	0.3		
	V-18	1	0.055			0.5
	V-19	1	0.055			0.5
125. selenium	V-8	1	<0.001	0.0018		
	V-18	1	<0.001			<0.001
	V-19	1	<0.001			0.0033

Concentrations (mg/l): Source, Day 1, Day 2, Day 3

Table V-204 (Continued)

URANIUM AREA CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	V-8	1	<0.0005	0.0011		
	V-18	1	<0.0005		0.001	
	V-19	1	<0.0005		0.0008	
127. thallium	V-8	1	<0.001	<0.001		
	V-18	1	<0.001		<0.001	
	V-19	1	<0.001		<0.001	
128. zinc	V-8	1	0.101	11.0		
	V-18	1	0.101		5.2	
	V-19	1	0.101		4.0	
Nonconventional Pollutants						
Acidity	V-8	1	<10.0	<10		
	V-18	1	<10.0		<10	
	V-19	1	<10.0		<10	
Alkalinity	V-8	1	33.0	634		
	V-18	1	33.0		1,060	
	V-19	1	33.0		618	
Aluminum	V-8	1	0.131	54.0		
	V-18	1	0.131		23.0	
	V-19	1	0.131		34.0	
Ammonia Nitrogen	V-18	1	0.07		1.2	
	V-19	1	0.07		2.1	
Barium	V-8	1	0.2	1.0		
	V-18	1	0.2		36.0	
	V-19	1	0.2		8.7	
Boron	V-8	1	<0.2	0.4		
	V-18	1	<0.2		0.6	
	V-19	1	<0.2		0.1	
Calcium	V-8	1	0.045	416.0		
	V-18	1	0.045		320.0	
	V-19	1	0.045		739.0	
Chemical Oxygen Demand (COD)	V-8	1	<50.0	<50		
	V-18	1	<50.0		10	
	V-19	1	<50.0		15	

Table V-204 (Continued)

URANIUM AREA CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chloride	V-8	1	36.0	97		
	V-18	1	36.0		445	
	V-19	1	36.0		74	
Cobalt	V-8	1	0.044	0.23		
	V-18	1	0.044		0.4	
	V-19	1	0.044		0.4	
Fluoride	V-8	1	0.41	6.4		
	V-18	1	0.41		1.6	
	V-19	1	0.41		1.8	

Table V-204 (Continued)

URANIUM AREA CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	V-8	1	0.16	50.0		
	V-18	1	0.16		66.0	
	V-19	1	0.16		48.0	
Magnesium	V-8	1	8.0	151.0		
	V-18	1	8.0		330.0	
	V-19	1	8.0		1,499.0	
Manganese	V-8	1	0.058	1.6		
	V-18	1	0.058		1.8	
	V-19	1	0.058		2.3	
Molybdenum	V-8	1	<0.03	0.5		
	V-18	1	<0.03		0.5	
	V-19	1	<0.03		0.6	
Nitrate	V-8	1	<0.09	790		
	V-18	1	<0.09		77	
	V-19	1	<0.09		75	
Phosphorus	V-8	1	0.5	2.5		
	V-18	1	0.5		39	
	V-19	1	0.5		2.6	
Sodium	V-8	1	74.0	1,769.0		
	V-18	1	74.0		3,145.0	
	V-19	1	74.0		10,298.0	
Sulfate	V-8	1	2.8	21		
	V-18	1	2.8		2.4	
	V-19	1	2.8		8.8	
Tin	V-8	1	<0.25	<0.25		
	V-18	1	<0.25		<0.25	
	V-19	1	<0.25		<0.25	
Titanium	V-8	1	<0.2	3.7		
	V-18	1	<0.2		2.8	
	V-19	1	<0.2		1.8	

Table V-204 (Continued)

URANIUM AREA CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Dissolved Solids (TDS)	V-8	1	300.0	6,600		
	V-18	1	300.0		3,400	
	V-19	1	300.0		680	
Total Organic Carbon (TOC)	V-8	1	<10.0	2,700		
	V-18	1	<10.0		2	
	V-19	1	<10.0		2	
Total Solids (TS)	V-8	1	330.0	9,500		
	V-18	1	330.0		4,400	
	V-19	1	330.0		3,100	
Uranium	V-8	1	0.89	49		
	V-18	1	0.89		130	
	V-19	1	0.89		79	

Table V-204 (Continued)

URANIUM AREA CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	V-8	1	<0.03	<0.3		
	V-18	1	<0.03		0.8	
	V-19	1	<0.03		0.8	
Yttrium	V-8	1	<0.1	2.0		
	V-18	1	<0.1		11.0	
	V-19	1	<0.1		14.0	
			Concentrations (nCi/L)			
Gross Alpha	V-8	1	0.014	76.4		
	V-18	1	0.014		227	
	V-19	1	0.014		315	
Gross Beta	V-8	1	<0.013	109		
	V-18	1	<0.013		314	
	V-19	1	<0.013		479	
Radium-226	V-8	1	<0.0008	0.03		
	V-18	1	<0.0008		0.143	
	V-19	1	<0.0008		0.183	
Conventional Pollutants						
Oil and Grease	V-8	1	<1.0	6,000		
	V-18	1	<1.0		17	
	V-19	1	<1.0		25	
Total Suspended Solids (TSS)	V-8	1	<1.0	775		
	V-18	1	<1.0		60	
	V-19	1	<1.0		1,600	
pH (standard units)	V-8	1	6	10		
	V-18	1	6		10	
	V-19	1	6		9	

1. The following toxic pollutants were not detected in this waste stream: 1-21, 24-65, and 67-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-205

URANIUM WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	0	0
2	NR	NR	P	3.49	0.836

Table V-206

URANIUM WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	V-5	1	<0.0006	<0.0006		
115. arsenic	V-5	1	<0.001	<0.001		
117. beryllium	V-5	1	0.012	0.02		
118. cadmium	V-5	1	<0.03	<0.03		
119. chromium (total)	V-5	1	0.061	<0.03		
120. copper	V-5	1	0.088	0.15		
121. cyanide (total)	V-5	1	<0.01	<0.1		
122. lead	V-5	1	0.036	0.6		
123. mercury	V-5	1	<0.005	<0.005		
124. nickel	V-5	1	0.055	0.081		
125. selenium	V-5	1	<0.001	<0.001		
126. silver	V-5	1	<0.0005	0.0007		
127. thallium	V-5	1	<0.001	<0.0078		
128. zinc	V-5	1	0.101	1.1		
Nonconventional Pollutants						
Acidity	V-5	1	<10.0	<10		
Alkalinity	V-5	1	33.0	>2,000		
Aluminum	V-5	1	0.131	0.6		
Ammonia Nitrogen	V-5	1	0.07	2.0		
Barium	V-5	1	0.2	<0.1		

Table V-206 (Continued)

URANIUM WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	V-5	1	<0.2	0.6		
Calcium	V-5	1	0.045	0.8		
Chemical Oxygen Demand (COD)	V-5	1	<50.0	120		
Chloride	V-5	1	36.0	4,100		
Cobalt	V-5	1	0.044	0.088		
Fluoride	V-5	1	0.41	31		
Iron	V-5	1	0.16	0.4		
Magnesium	V-5	1	8.0	0.78		
Manganese	V-5	1	0.058	0.1		
Molybdenum	V-5	1	<0.03	0.23		
Phosphorue	V-5	1	0.5	3.4		
Sodium	V-5	1	74.0	141.0		
Sulfate	V-5	1	2.8	5.3		
Tin	V-5	1	<0.25	<0.2		

Table V-206 (Continued)

URANIUM WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	V-5	1	<0.2	1.2		
Total Dissolved Solids (TDS)	V-5	1	300.0	510,000		
Total Organic Carbon (TOC)	V-5	1	<10.0	280		
Total Solids (TS)	V-5	1	330.0	510,000		
Uranium	V-5	1	0.89	1,000		
Vanadium	V-5	1	<0.03	0.16		
Yttrium	V-5	1	<0.1	0.2		
Nonconventional Pollutants (Continued)			Concentrations (nCi/L)			
Gross Alpha	V-5	1	0.014	134		
Gross Beta	V-5	1	<0.013	1,970		
Radium-226	V-5	1	<0.0008	0.011		
			Concentrations (mg/l)			
Conventional Pollutants						
Oil and Grease	V-5	1	<1.0	<1		
Total Suspended Solids (TSS)	V-5	2	<1.0	650		
pH (standard units)	V-5	1	6	9		

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-207

URANIUM DRUM WASHWATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	>0	44.3	10.6

Table V-208

URANIUM DRUM WASH WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	V-9	1	<0.0006			<0.0006
115. arsenic	V-9	1	<0.001			<0.001
117. beryllium	V-9	1	0.012			0.013
118. cadmium	V-9	1	<0.03			<0.03
119. chromium (total)	V-9	1	0.061			0.06
120. copper	V-9	1	0.088			0.6
121. cyanide (total)	V-9	1	<0.01			<0.1
122. lead	V-9	1	0.036			0.22
123. mercury	V-9	1	<0.005			<0.005
124. nickel	V-9	1	0.055			<0.03
125. selenium	V-9	1	<0.001			<0.001
126. silver	V-9	1	<0.0005			<0.0005
127. thallium	V-9	1	<0.001			<0.001
128. zinc	V-9	1	0.101			0.8
Nonconventional Pollutants						
Acidity	V-9	1	<10.0			<10
Alkalinity	V-9	1	33.0			779
Aluminum	V-9	1	0.131			2.2
Ammonia Nitrogen	V-9	1	0.07			0.30
Barium	V-9	1	0.2			0.3
Boron	V-9	1	<0.2			0.04
Calcium	V-9	1	0.045			56.0

Table V-208 (Continued)

URANIUM DRUM WASH WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	V-9	1	<50.0			10
Chloride	V-9	1	36.0			850
Cobalt	V-9	1	0.044			0.041
Fluoride	V-9	1	0.41			3.5
Iron	V-9	1	0.16			4.3
Magnesium	V-9	1	8.0			28.6

Table V-208 (Continued)

URANIUM DRUM WASH WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	V-9	1	0.058		0.2	
Molybdenum	V-9	1	<0.03		<0.03	
Nitrate	V-9	1	<0.09		4.3	
Phosphorus	V-9	1	0.5		310	
Sodium	V-9	1	74.0		678.0	
Sulfate	V-9	1	2.8		5.4	
Tin	V-9	1	<0.25		<0.2	
Titanium	V-9	1	<0.2		<0.2	
Total Dissolved Solids (TDS)	V-9	1	300.0		2,100	
Total Organic Carbon (TOC)	V-9	1	<10.0		2	
Total Solids (TS)	V-9	1	330.0		2,300	
Uranium	V-9	1	0.89		5.7	
Vanadium	V-9	1	<0.03		0.03	
Yttrium	V-9	1	<0.1		0.1	
			Concentrations (nCi/L)			
Gross Alpha	V-9	1	0.014		3.7	
Gross Beta	V-9	1	<0.013		4.5	
Radium-226	V-9	1	<0.0008		0.0019	

Table V-208 (Continued)

URANIUM DRUM WASH WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Conventional Pollutants						
Oil and Grease	V-9	1	<1.0			12
Total Suspended Solids (TSS)	V-9	1	<1.0			23
pH (standard units)	V-9	1	6			9-10

1. No analyses were performed for the following toxic pollutants: 1-113, 116, and 129.

Table V-209

URANIUM LAUNDRY WASHWATER

Plant	Water Use liters/ employee-day	Water Use gallons/ employee-day	Percent Recycle	Water Use liters/ employee-day	Water Use gallons/ employee-day
1	52.4	12.6	0	52.4	12.6

Table V-210

URANIUM LAUNDRY WASH WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	V-7	1	<0.0006	<0.0006		
115. arsenic	V-7	1	<0.001	0.028		
117. beryllium	V-7	1	0.012	0.015		
118. cadmium	V-7	1	<0.03	<0.03		
119. chromium (total)	V-7	1	0.061	<0.03		
120. copper	V-7	1	0.088	0.25		
121. cyanide (total)	V-7	1	<0.01	<0.1		
122. lead	V-7	1	0.036	0.042		
123. mercury	V-7	1	<0.005	<0.005		
124. nickel	V-7	1	0.055	<0.03		
125. selenium	V-7	1	<0.001	<0.001		
126. silver	V-7	1	<0.0005	0.0048		
127. thallium	V-7	1	<0.001	<0.001		
128. zinc	V-7	1	0.101	0.7		
Nonconventional Pollutants						
Acidity	V-7	1	<10.0	<10		
Alkalinity	V-7	1	33.0	59		
Aluminum	V-7	1	0.131	0.9		
Ammonia Nitrogen	V-7	1	0.07	2.3		
Barium	V-7	1	0.2	0.2		
Boron	V-7	1	<0.2	0.3		

Table V-210 (Continued)

URANIUM LAUNDRY WASH WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Calcium	V-7	1	0.045	17.0		
Chemical Oxygen Demand (COD)	V-7	1	<50.0	<50		
Chloride	V-7	1	36.0	210		
Cobalt	V-7	1	0.044	0.25		
Fluoride	V-7	1	0.41	0.79		
Iron	V-7	1	0.16	0.16		
Magnesium	V-7	1	8.0	5.3		
Manganese	V-7	1	0.058	0.2		

Table V-210 (Continued)

URANIUM LAUNDRY WASH WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Molybdenum	V-7	1	<0.03	<0.03		
Nitrate	V-7	1	<0.09	<0.09		
Phosphorus	V-7	1	0.5	12		
Sodium	V-7	1	74.0	133.0		
Sulfate	V-7	1	2.8	14		
Tin	V-7	1	<0.25	<0.2		
Titanium	V-7	1	<0.2	<0.2		
Total Dissolved Solids (TDS)	V-7	1	300.0	590		
Total Organic Carbon (TOC)	V-7	1	<10.0	46		
Total Solids (TS)	V-7	1	330.0	630		
Uranium	V-7	1	0.89	0.51		
Vanadium	V-7	1	<0.03	<0.03		
Yttrium	V-7	1	<0.1	7.3		
			Concentrations (nCi/L)			
Gross Alpha	V-7	1	0.014	13.7		
Gross Beta	V-7	1	<0.013	18.5		
Radium-226	V-7	1	<0.0008	3.6		
			Concentrations (mg/l)			
Conventional Pollutants						
Oil and Grease	V-7	1	<1.0	42		
Total Suspended Solids (TSS)	V-7	1	<1.0	11		
pH (standard units)	V-7	1	6	6		

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-211

ZINC ROLLING SPENT NEAT OILS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0	0

NR - Data not reported

Table V-212

ZINC ROLLING SPENT EMULSIONS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0	0
2	NR	NR	P	1.39 (CH)	0.334 (CH)
3	NR	NR	NR	NR (LA)	NR (LA)

NR - Data not reported
CH - Contract hauled
LA - Land application
P - Periodically discharged

Table V-213

ZINC ROLLING CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	471	113	0	471	113
	600	144	0	600	144
2	NR	NR	P	NR	NR

NR - Data not reported
P - Periodically discharged

Table V-214

ZINC DRAWING SPENT EMULSIONS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	5.80 (CH)	1.39 (CH)
2	NR	NR	P	NR (CH)	NR (CH)
3	NR	NR	P	NR	NR
4	NR	NR	P	NR	NR

NR - Data not reported
CH - Contract hauled
P - Periodically discharged

Table V-215

ZINC DIRECT CHILL CASTING CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0	0
2	505	121	0	505	121

NR - Data not reported

Table V-216

ZINC STATIONARY CASTING CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0 (+)	0 (+)

NR - Data not reported
\+ - Loss due to evaporation

Table V-217

ZINC HEAT TREATMENT CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	P	763	183

NR - Data not reported
P - Periodically discharged

Table V-218

ZINC SURFACE TREATMENT SPENT BATHS

Plant	Wastewater Discharge l/kkg	gal/ton
1	65.1	15.6
	70.9	17.0
	130	31.2
2	NR	NR

NR - Data not reported

Table V-219

ZINC SURFACE TREATMENT RINSE

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	4,170	1,000	0	4,170	1,000
	5,000	1,200	0	5,000	1,200
2	1,570	376	0	1,570	376

NR - Data not reported

Table V-220

ZINC SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
3. acrylonitrile	G-3	1	0.002	0.001		
4. benzene	G-3	1	0.017	0.015		
6. carbon tetrachloride	G-3	1	0.004	0.003		
7. chlorobenzene	G-3	1	**	**		
10. 1,2-dichloroethane	G-3	1	**	**		
11. 1,1,1-trichloroethane	G-3	1	0.003	ND		
13. 1,1-dichloroethane	G-3	1	0.001	0.001		
14. 1,1,2-trichloroethane	G-3	1	**	**		
15. 1,1,2,2-tetrachloroethane	G-3	1	0.001	0.001		
18. bis(2-chloroethyl)ether	G-3	1	ND	0.001		
23. chloroform	G-3	1	0.051	0.015		
29. 1,1-dichloroethylene	G-3	1	0.002	0.002		
30. 1,2-*trans*-dichloroethylene	G-3	1	0.002	0.002		
32. 1,2-dichloropropane	G-3	1	0.002	**		
33. 1,3-dichloropropene	G-3	1	**	**		
34. 2,4-dimethylphenol	G-3	1	ND	0.005		
36. 2,6-dinitrotoluene	G-3	1	0.002	0.002		
37. 1,2-diphenylhydrazine	G-3	1	**	**		
38. ethylbenzene	G-3	1	0.011	0.011		
39. fluoranthene	G-3	1	0.001	ND		
43. bis(2-chloroethoxy)methane	G-3	1	**	0.001		
44. methylene chloride	G-3	1	0.003	0.008		

Table V-220 (Continued)

ZINC SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
46. methyl bromide (bromomethane)	G-3	1	**	ND		
47. bromoform (tribromomethane)	G-3	1	0.002	0.002		
48. dichlorobromomethane	G-3	1	0.005	0.001		
51. chlorodibromomethane	G-3	1	0.031	0.140		
55. naphthalene	G-3	1	**	0.001		
66. bis(2-ethylhexyl) phthalate	G-3	1	0.003	**		
67. butyl benzyl phthalate	G-3	1	0.001	0.002		
68. di-n-butyl phthalate	G-3	1	0.017	0.037		
69. di-n-octyl phthalate	G-3	1	**	ND		
70. diethyl phthalate	G-3	1	0.009	0.016		
72. benzo(a)anthracene	G-3	1	0.001	0.001		
74. benzo(b)fluoranthene	G-3	1	0.002	ND		
75. benzo(k)fluoranthane	G-3	1	0.002	ND		
76. chrysene	G-3	1	0.001	0.001		
78. anthracene	G-3	1	0.001	**		
79. benzo(ghi)perylene	G-3	1	0.007	ND		
80. fluorene	G-3	1	0.001	ND		
81. phenanthrene	G-3	1	0.001	**		
83. indeno(1,2,3-c,d)pyrene	G-3	1	0.016	ND		
84. pyrene	G-3	1	0.001	ND		
85. tetrachloroethylene	G-3	1	0.009	0.009		
86. toluene	G-3	1	0.007	0.002		

Table V-220 (Continued)

ZINC SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
87. trichloroethylene	G-3	1	0.009	0.008		
114. antimony	G-3	1	<0.010	<0.010		
115. arsenic	G-3	1	<0.010	<0.010		
117. beryllium	G-3	1	<0.005	<0.005		
118. cadmium	G-3	1	<0.020	<0.020		
119. chromium (total)	G-3	1	<0.020	0.160		
120. copper	G-3	1	<0.050	<0.050		
121. cyanide (total)	G-3	1	<0.07	<0.03		
122. lead	G-3	1	<0.050	<0.050		
123. mercury	G-3	1	<0.0002	<0.0002		
124. nickel	G-3	1	<0.050	8.10		
125. selenium	G-3	1	<0.010	<0.010		
126. silver	G-3	1	<0.010	<0.010		
127. thallium	G-3	1	<0.010	<0.050		
128. zinc	G-3	1	0.100	42.3		
Nonconventional Pollutants						
Acidity	G-3	1	<1	<1		
Alkalinity	G-3	1	67	26		
Aluminum	G-3	1	0.100	0.500		
Ammonia Nitrogen	G-3	1	<0.02	<0.02		
Barium	G-3	1	<0.050	<0.050		

Table V-220 (Continued)

ZINC SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Boron	G-3	1	0.100	0.100		
Calcium	G-3	1	29.1	30.0		
Chemical Oxygen Demand (COD)	G-3	1	560	<1		
Chloride	G-3	1	36	<1		
Cobalt	G-3	1	<0.050	<0.050		
Fluoride	G-3	1	96	108		
Iron	G-3	1	< 0.050	0.150		
Magnesium	G-3	1	4.10	4.30		
Manganese	G-3	1	< 0.050	< 0.050		
Molybdenum	G-3	1	< 0.050	< 0.050		
Phenolics	G-3	1	< 0.005	< 0.005		
Phosphate	G-3	1	1.6	300		
Sodium	G-3	1	6.00	8.10		
Sulfate	G-3	1	47	49		
Tin	G-3	1	< 0.050	< 0.050		
Titanium	G-3	1	< 0.050	< 0.050		
Total Dissolved Solids (TDS)	G-3	1	160	380		
Total Organic Carbon (TOC)	G-3	1	< 1	< 1		
Total Solids (TS)	G-3	1	92	400		
Vanadium	G-3	1	< 0.050	< 0.050		
Yttrium	G-3	1	< 0.050	< 0.050		

Table V-220 (Continued)

ZINC SURFACE TREATMENT RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	G-3	1	4	< 1		
Total Suspended Solids (TSS)	G-3	1	10	20		
pH (standard units)	G-3	1	7.98	5.72		

**Present, but not quantifiable.

1. The following toxic pollutants were not detected in this waste stream: 1, 2, 5, 8, 9, 12, 16, 17, 19-22, 24-28, 31, 35, 40-42, 45, 49, 50, 52-54, 56-65, 71, 73, 77, 82, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-221

ZINC ALKALINE CLEANING SPENT BATHS

Plant	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	1.67	0.400
2	5.42	1.30

Table V-222

ZINC ALKALINE CLEANING RINSE

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	2,290	549	CCR2	2,290	549
2	1,080	260	0 (S)	1,080	260

CCR2 - Two-stage countercurrent cascade rinsing
S - Spray rinsing

Table V-223

ZINC ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
1. acenaphthene	G-2	1	ND	**		
3. acrylonitrile	G-2	1	0.002	0.001		
4. benzene	G-2	1	0.017	0.004		
6. carbon tetrachloride	G-2	1	0.004	0.003		
7. chlorobenzene	G-2	1	**	**		
10. 1,2-dichloroethane	G-2	1	**	**		
11. 1,1,1-trichloroethane	G-2	1	0.003	0.003		
13. 1,1-dichloroethane	G-2	1	0.001	0.001		
14. 1,1,2-trichloroethane	G-2	1	**	**		
15. 1,1,2,2-tetrachloroethane	G-2	1	0.001	0.001		
18. bis(2-chloroethyl)ether	G-2	1	ND	**		
23. chloroform	G-2	1	0.051	0.013		
29. 1,1-dichloroethylene	G-2	1	0.002	0.002		
30. 1,2-trans-dichloroethylene	G-2	1	0.002	0.002		
32. 1,2-dichloropropane	G-2	1	0.002	0.002		
33. 1,3-dichloropropene	G-2	1	**	0.001		
36. 2,6-dinitrotoluene	G-2	1	0.002	0.003		
37. 1,2-diphenylhydrazine	G-2	1	**	**		
38. ethylbenzene	G-2	1	0.011	0.011		
39. fluoranthene	G-2	1	0.001	0.001		
43. bis(2-chloroethoxy)methane	G-2	1	**	0.001		
44. methylene chloride	G-2	1	0.003	0.008		

Table V-223 (Continued)

ZINC ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
46. methyl bromide (bromomethane)	G-2	1	**	**		
47. bromoform (tribromomethane)	G-2	1	0.002	0.002		
48. dichlorobromomethane	G-2	1	0.005	0.002		
51. chlorodibromomethane	G-2	1	0.031	0.090		
55. naphthalene	G-2	1	**	0.002		
66. bis(2-ethylhexyl) phthalate	G-2	1	0.003	0.075		
67. butyl benzyl phthalate	G-2	1	0.001	0.001		
68. di-n-butyl phthalate	G-2	1	0.017	ND		
69. di-n-octyl phthalate	G-2	1	**	ND		
70. diethyl phthalate	G-2	1	0.009	0.011		
72. benzo(a)anthracene	G-2	1	0.001	0.005		
74. benzo(b)fluoranthene	G-2	1	0.002	ND		
75. benzo(k)fluoranthene	G-2	1	0.002	ND		
76. chrysene	G-2	1	0.001	ND		
78. anthracene	G-2	1	0.001	0.001		
79. benzo(ghi)perylene	G-2	1	0.007	ND		
80. fluorene	G-2	1	0.001	ND		
81. phenanthrene	G-2	1	0.001	0.003		
83. indeno(1,2,3-c,d)pyrene	G-2	1	0.016	0.016		
84. pyrene	G-2	1	0.001	ND		
85. tetrachloroethylene	G-2	1	0.009	0.009		
86. toluene	G-2	1	0.007	0.004		

Table V-223 (Continued)

ZINC ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
87. trichloroethylene	G-2	1	0.009	0.006		
114. antimony	G-2	1	<0.010	<0.010		
115. arsenic	G-2	1	<0.010	<0.010		
117. beryllium	G-2	1	<0.005	<0.005		
118. cadmium	G-2	1	<0.020	<0.020		
119. chromium (total)	G-2	1	<0.020	<0.020		
120. copper	G-2	1	<0.050	<0.050		
121. cyanide (total)	G-2	1	0.07	1.3		
122. lead	G-2	1	<0.050	<0.050		
123. mercury	G-2	1	<0.0002	<0.0002		
124. nickel	G-2	1	<0.050	<0.050		
125. selenium	G-2	1	<0.010	<0.010		
126. silver	G-2	1	<0.010	<0.010		
127. thallium	G-2	1	<0.010	<0.010		
128. zinc	G-2	1	0.100	1.12		
Nonconventional Pollutants						
Acidity	G-2	1	<1	<1		
Alkalinity	G-2	1	67	84		
Aluminum	G-2	1	0.100	0.100		
Ammonia Nitrogen	G-2	1	<0.02	<0.02		
Barium	G-2	1	<0.050	<0.050		
Boron	G-2	1	0.100	0.100		

Table V-223 (Continued)

ZINC ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Calcium	G-2	1	29.1	29.0		
Chemical Oxygen Demand (COD)	G-2	1	560	<1		
Chloride	G-2	1	36	<1		
Cobalt	G-2	1	<0.050	<0.050		
Fluoride	G-2	1	96	95		
Iron	G-2	1	<0.050	0.550		
Magnesium	G-2	1	4.10	4.10		
Manganese	G-2	1	<0.050	<0.050		
Molybdenum	G-2	1	<0.050	<0.050		
Phenolics	G-2	1	<0.005	<0.005		
Phosphate	G-2	1	1.6	3.5		
Sodium	G-2	1	6.00	14.2		
Sulfate	G-2	1	47	53		
Tin	G-2	1	<0.050	<0.050		
Titanium	G-2	1	<0.050	<0.050		
Total Dissolved Solids (TDS)	G-2	1	160	190		
Total Organic Carbon (TOC)	G-2	1	<1	54		
Total Solids (TS)	G-2	1	92	280		
Vanadium	G-2	1	<0.050	<0.050		
Yttrium	G-2	1	<0.050	<0.050		

Table V-223 (Continued)

ZINC ALKALINE CLEANING RINSE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	G-2	1	4	23		
Total Suspended Solids (TSS)	G-2	1	10	90		
pH (standard units)	G-2	1	7.98	7.55		

**Present, but not quantifiable.

1. The following toxic pollutants were not detected in this waste stream: 2, 5, 8, 9, 12, 16, 17, 19-22, 24-28, 31, 34, 35, 40-42, 45, 49, 50, 52-54, 56-65, 71, 73, 77, 82, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-224

ZINC SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100 (P)	23.8	5.71

NR - Data not reported
P - Periodically discharged

Table V-225

ZINC ELECTROCOATING RINSE

Plant	Water Use		Percent Recycle	Wastewater Discharge	
	l/kkg	gal/ton		l/kkg	gal/ton
1	2,294	550	0	2,294	550

Table V-226

ZIRCONIUM-HAFNIUM ROLLING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-227

ZIRCONIUM-HAFNIUM DRAWING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	0.00	0.00
2	NR	NR	NR	NR	NR
3	NR	NR	NR	NR	NR
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-228

ZIRCONIUM-HAFNIUM EXTRUSION SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	0.00	0.00
2	4.74	1.14	0.0	0.00	0.00
3	NR	NR	0.0	0.00	0.00
3	NR	NR	0.0	0.00	0.00
4	NR	NR	0.0	0.00	0.00
Average	4.74	1.14		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-229

ZIRCONIUM-HAFNIUM EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	237.4	56.94	0.0	237.4	56.94
Average	237.4	56.94		237.4	56.94

*Discharge from operation.

Table V-230

ZIRCONIUM-HAFNIUM EXTRUSION PRESS HYDRAULIC FLUID LEAKAGE
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Fluoride	AK-3	3	-	2.3		
Conventional Pollutants						
Oil and Grease	AK-3	3	-	10.0		
Total Suspended Solids (TSS)	AK-3	3	-	7.0		
pH	AK-3	3	-	6.8		

Table V-231

ZIRCONIUM-HAFNIUM SWAGING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-232

ZIRCONIUM-HAFNIUM TUBE REDUCING SPENT LUBRICANTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	0.00	0.00
2	2,364	566.9	0.0	298.3	71.52
3	1,051	252.0	0.0	1,051	252.0
4	3,315	794.9	0.0	3,315	794.9
5	7,359	1,765	0.0	7,359	1,765
3	NR	NR	NR	NR	NR
Average	3,522	844.6		3,006	720.8

NR - Data not reported

*Discharge from operation.

Table V-233

ZIRCONIUM-HAFNIUM HEAT TREATMENT CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	135.2	32.43	P	135.2	32.43
2	285.4	68.43	P	285.4	68.43
1	400.7	96.10	0.0	400.7	96.10
1	6,005	1,440	0.0	6,005	1,440
3	NR	NR	NR	NR	NR
3	NR	NR	NR	NR	NR
Average	1,707	409.2		1,707	409.2

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-234

ZIRCONIUM-HAFNIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant		Stream Code	Sample Type	Concentrations (mg/l)			
				Source	Day 1	Day 2	Day 3
Toxic Pollutants							
117.	beryllium	BV-1		-	<0.010		
		BV-2		-	<0.001		
		BV-3		-	<0.001		
		AK-4	3	-	<0.020		
118.	cadmium	BV-1		-	0.061		
		BV-2		-	<0.005		
		BV-3		-	<0.005		
		AK-4	3	-	<0.010		
119.	chromium (total)	BV-1		-	0.670		
		BV-2		-	0.110		
		BV-3		-	0.280		
		AK-4	3	-	<0.020		
120.	copper	BV-1		-	0.180		
		BV-2		-	0.012		
		BV-3		-	0.080		
		AK-4	3	-	0.420		
122.	lead	BV-1		-	3.500		
		BV-2		-	<0.050		
		BV-3		-	<0.050		
		AK-4	3	-	<0.020		
124.	nickel	BV-1		-	0.490		
		BV-2		-	0.031		
		BV-3		-	<0.012		
		AK-4	3	-	<0.020		
128.	zinc	BV-1		-	0.035		
		BV-2		-	0.024		
		BV-3		-	0.040		
		AK-4	3	-	0.170		

Table V-234 (Continued)

ZIRCONIUM-HAFNIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
Aluminum	BV-1		-	3.000		
	BV-2		-	0.170		
	BV-3		-	0.045		
	AK-4	3	-	<0.050		
Hafnium	BV-1		-	9.600		
	BV-2		-	2.100		
	BV-3		-	ND		
Iron	BV-1		-	12.000		
	BV-2		-	2.500		
	BV-3		-	0.730		
	AK-4	3	-			
Magnesium	BV-1		-	22.000		
	BV-2		-	0.140		
	BV-3		-	30.000		
	AK-4	3	-	ND		
Molybdenum	BV-1		-	370.0		
	BV-2		-	0.270		
	BV-3		-	0.280		
	AK-4	3	-	ND		
Titanium	BV-1		-	<0.100		
	BV-2		-	0.015		
	BV-3		-	<0.010		
	AK-4	3	-	<0.050		

Table V-234 (Continued)

ZIRCONIUM-HAFNIUM HEAT TREATMENT CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
Zirconium	BV-1		-	1.600		
	BV-2		-	87.000		
	BV-3		-	0.052		
	AK-4	3	-	<0.100		

1. No analyses were performed for the following toxic pollutants: 1-116, 121, 123, 125-127 and 129.

Table V-235

ZIRCONIUM-HAFNIUM SURFACE TREATMENT SPENT BATHS

Plant	Wastewater Discharge* L/kkg	gal/ton
1	101.8	24.40
2	235.6	56.49
1	239.2	57.36
3	282.7	67.78
4	340.0	81.54
5	375.9	90.14
6	493.4	118.3
1	693.9	166.4
6	883.7	211.9
3	64,260	15,410
7	NR	NR
8	NR	NR
4	NR	NR
8	NR	NR
4	NR	NR
Average	6,791	1,628

NR - Data not reported

*Discharge from operation.

Table V-236

ZIRCONIUM-HAFNIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
2. acrolein	P-2	1	ND	ND		
	P-3	1	ND	0.021		
4. benzene	P-2	1	ND	<0.010		
	P-3	1	ND	<0.010		
7. chlorobenzene	P-2	1	ND	<0.010		
	P-3	1	ND	<0.010		
11. 1,1,1-trichloroethane	P-2	1	ND	0.023		
	P-3	1	ND	0.390		
13. 1,1-dichloroethane	P-2	1	ND	ND		
	P-3	1	ND	<0.010		
23. chloroform	P-2	1	0.023	<0.010		
	P-3	1	0.023	<0.010		
38. ethylbenzene	P-2	1	ND	<0.010		
	P-3	1	ND	0.018		
44. methylene chloride	P-2	1	ND	0.480		
	P-3	1	ND	0.016		
48. dichlorobromomethane	P-2	1	0.002	ND		
	P-3	1	0.002	ND		
57. 2-nitrophenol	P-2	1	ND	ND		
	P-3	1	ND	<0.010		
66. bis(2-ethylhexyl) phthalate	P-2	1		<0.010		

Table V-236 (Continued)

ZIRCONIUM-HAFNIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
68. di-n-butyl phthalate	P-2	1		<0.010		
	P-3	1		<0.010		
70. diethyl phthalate	P-2	1		<0.010		
	P-3	1		<0.010		
78. anthracene (a)	P-2	1		<0.010		
	P-3	1		ND		
81. phenanthrene (a)	P-2	1		<0.010		
	P-3	1		ND		
85. tetrachloroethylene	P-2	1	ND	ND		
	P-3	1	ND	<0.010		
86. toluene	P-2	1	ND	<0.010		
	P-3	1	ND	0.015		
87. trichloroethylene	P-2	1	ND	<0.010		
	P-3	1	ND	<0.010		

Table V-236 (Continued)

ZIRCONIUM-HAFNIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
114. antimony	P-2	1	ND	5		
	P-3	1	ND	6		
115. arsenic	P-2	1	ND	3		
	P-3	1	ND	0.6		
117. beryllium	P-2	1	ND	<0.2		
	P-3	1	ND	<0.2		
118. cadmium	P-2	1	0.010	0.09		
	P-3	1	0.010	<0.07		
119. chromium (total)	P-2	1	ND	24		
	P-3	1	ND	12		
120. copper	P-2	1	0.008	1.2		
	P-3	1	0.008	0.1		
121. cyanide (total)	P-2	1		0.118		
	P-3	1		0.356		
122. lead	P-2	1	ND	1.4		
	P-3	1	ND	0.53		

Table V-236 (Continued)

ZIRCONIUM-HAFNIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	P-2	1		0.0056		
	P-3	1		<0.0022		
124. nickel	P-2	1	ND	3.6		
	P-3	1	ND	0.64		
125. selenium	P-2	1	0.013	<0.02		
	P-3	1	0.013	<0.02		
126. silver	P-2	1	ND	<0.02		
	P-3	1	ND	<0.02		
127. thallium	P-2	1	ND	0.57		
	P-3	1	ND	<0.5		
128. zinc	P-2	1	ND	7.5		
	P-3	1	ND	0.17		

Table V-236 (Continued)

ZIRCONIUM-HAFNIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Alkalinity	P-2	1		0.0		
	P-3	1		8,910		
Ammonia Nitrogen	P-2	1	<0.1	6.81		
	P-3	1	<0.1	104		
Calcium	P-2	1		208		
	P-3	1		5.60		
Fluoride	P-2	1	<0.10	17,100		
	P-3	1	<0.10	6,500		
Magnesium	P-2	1		11.7		
	P-3	1		2.90		
Phenolics	P-2	1		0.026		
	P-3	1		0.053		
Sulfate	P-2	1		1,080		
	P-3	1		142		

Table V-236 (Continued)

ZIRCONIUM-HAFNIUM SURFACE TREATMENT SPENT BATHS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Dissolved Solids (TDS)	P-2	1		140,000		
	P-3	1		36,400		
Conventional Pollutants						
Oil and Grease	P-2	1	1.1	83.9		
	P-3	1	1.1	1.87		
Total Suspended Solids (TSS)	P-2	1	<0.5	8.70		
	P-3	1	<0.5	12.6		
pH (standard units)	P-2	1		<1		
	P-3	1		3.7		

(a) Reported together

1. Toxic pollutants 89-113 were analyzed in this waste stream.

2. The following toxic pollutants were not detected in this waste stream: 1, 3, 5, 6, 8-10, 12, 14-22, 24-37, 39-43, 45-47, 49-56, 58-65, 67, 69, 71, 77, 79, 80, 82-84.

3. No analyses were performed on the following toxic pollutants: 116 and 129.

Table V-237

ZIRCONIUM-HAFNIUM SURFACE TREATMENT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	296.7	71.14	0.0	296.7	71.14
2	1,302	312.2	0.0	1,302	312.2
1	2,057	493.3	0.0	2,057	493.3
2	2,266	543.5	0.0	2,266	543.5
3	5,738	1,376	0.0	5,738	1,376
4	12,020	2,881	0.0	12,020	2,881
5	18,110	4,343	0.0	18,110	4,343
3	50,040	12,000	0.0	50,040	12,000
6	79,740	19,120	0.0	79,530	19,070
7	971,500	233,000	0.0	971,500	233,000
8	NR	NR	NR	NR	NR
8	NR	NR	NR	NR	NR
Average	114,300	27,410		114,300	27,410

NR - Data not reported

*Discharge from operation.

Table V-238

ZIRCONIUM-HAFNIUM ALKALINE CLEANING SPENT BATHS

Plant	Wastewater Discharge* L/kkg	gal/ton
1	12.44	2.98
2	37.16	8.91
2	64.96	15.58
3	232.0	55.63
4	239.8	57.50
2	321.1	77.00
5	632.0	151.3
1	955.2	229.1
1	1,244	298.3
6	1,962	470.6
3	3,689	884.8
6	9,812	2,353
5	NR	NR
Average	1,600	383.7

NR - Data not reported

*Discharge from operation.

Table V-239

ZIRCONIUM-HAFNIUM ALKALINE CLEANING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	321.1	77.00	0.0	321.1	77.00
2	597.0	143.2	0.0	597.0	143.2
1	815.0	195.5	0.0	815.0	195.5
3	5,176	1,241	0.0	5,176	1,241
2	7,589	1,820	0.0	7,589	1,820
2	8,955	2,148	0.0	8,955	2,148
4	80,150	19,220	0.0	79,410	19,040
5	166,800	40,000	0.0	166,800	40,000
6	181,600	43,560	0.0	181,600	43,560
5	313,900	75,280	0.0	313,900	75,280
7	NR	NR	NR	NR	NR
Average	31,390	7,530		31,390	7,530

NR - Data not reported

*Discharge from operation.

Table V-240

ZIRCONIUM-HAFNIUM MOLTEN SALT RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	20.86	5.00	0.0	20.86	5.00
2	15,090	3,619	0.0	15,090	3,619
Average	7,556	1,812		7,556	1,812

*Discharge from operation.

Table V-241

ZIRCONIUM-HAFNIUM SAWING OR GRINDING SPENT NEAT OILS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	0.0	0.00	0.00
Average	NR	NR		0.00	0.00

NR - Data not reported

*Discharge from operation.

Table V-242

ZIRCONIUM-HAFNIUM SAWING OR GRINDING SPENT EMULSIONS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	39.62	9.50	0.0	0.00	0.00
2	NR	NR	NR	0.00	0.00
2	NR	NR	0.0	0.00	0.00
2	NR	NR	P	281.1	67.42
3	NR	NR	NR	NR	NR
3	NR	NR	NR	NR	NR
3	NR	NR	NR	NR	NR
Average	39.62	9.50		281.1	67.42

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-243

ZIRCONIUM-HAFNIUM SAWING OR GRINDING CONTACT COOLING WATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	321.1	77.00	0.0	321.1	77.00
2	NR	NR	NR	NR	NR
Average	321.1	77.00		321.1	77.00

NR - Data not reported

*Discharge from operation.

Table V-244

ZIRCONIUM-HAFNIUM SAWING OR GRINDING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	122.9	29.46	0.0	122.9	29.46
2	592.0	142.0	0.0	592.0	142.0
1	3,002	720.0	0.0	3,002	720.0
2	19,620	4,706	0.0	19,620	4,706
Average	5,835	1,399		5,835	1,399

*Discharge from operation.

Table V-245

ZIRCONIUM-HAFNIUM INSPECTION AND TESTING WASTEWATER

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	15.43	3.70	0.0	15.43	3.70
2	56,270	13,490	0.0	56,270	13,490
3	NR	NR	NR	NR	NR
3	NR	NR	NR	NR	NR
Average	28,140	6,749		28,140	6,749

NR - Data not reported

*Discharge from operation.

Table V-246

ZIRCONIUM-HAFNIUM INSPECTION AND TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant		Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants							
117.	beryllium	BV-8		-	<0.001		
		AX-4	1	-	<0.100		
118.	cadmium	BV-8		-	<0.005		
		AX-4	1	-	<0.500		
119.	chromium (total)	BV-8		-	0.003		
		AX-4	1	-	<0.050		
120.	copper	BV-8		-	0.018		
		AX-4	1	-	0.050		
121.	cyanide	AX-4	1	-	<0.500		
122.	lead	BV-8		-	<0.050		
		AX-4	1	-	<0.100		
124.	nickel	BV-8		-	<0.012		
		AX-4	1	-	<0.100		
128.	zinc	BV-8		-	0.160		
		AX-4	1	-	1.000		

Table V-246 (Continued)

ZIRCONIUM-HAFNIUM INSPECTION AND TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Aluminum	BV-8		-	0.030		
Ammonia (as N)	AX-4	1	-	<0.05		
Cobalt	BV-8		-	<0.004		
Fluoride	AX-4	1	-	1.150		
Hafnium	BV-8		-	ND		
Iron	BV-8		-	0.040		
	AX-8	1	-	<0.100		
Molybdenum	BV-8		-	0.077		
Titanium	BV-8		-	<0.010		
	AX-4	1	-	<0.500		

Table V-246 (Continued)

ZIRCONIUM-HAFNIUM INSPECTION AND TESTING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	BV-8		-	<0.002		
	AX-4	1	-	<1.00		
Zirconium	BV-8		-	<0.020		
	AX-4	1	-	<2.5		
Conventional Pollutants						
Oil and Grease	BV-8		-	<1		
	AX-4	1	-	<2.00		
Total Suspended Solids (TSS)	AX-4	1	-	4.000		
pH	AX-4	1	-	7.3		

1. No analyses were performed on the following toxic pollutants: 1-116, 123, 125-127 and 129.

Table V-247

ZIRCONIUM-HAFNIUM DEGREASING SPENT SOLVENTS

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	NR	NR	100.0	0.00	0.00
2	85.57	20.52	P	85.57	20.52
3	NR	NR	P	NR	NR
Average	85.57	20.52		85.57	20.52

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-248

ZIRCONIUM-HAFNIUM DEGREASING RINSE

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	4,054	972.3	0.0	4,054	972.3
Average	4,054	972.3		4,054	972.3

*Discharge from operation.

Table V-249

ZIRCONIUM-HAFNIUM WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use L/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge* L/kkg	Wastewater Discharge* gal/ton
1	2,650	636.0	100.0	0.00	0.00
2	NR	NR	P	8.17	1.96
3	558.9	134.0	83.3	93.16	22.34
4	10,200	2,446	94.7	536.9	128.8
3	NR	NR	80.0	NR	NR
5	NR	NR	0.0	NR	NR
5	NR	NR	0.0	NR	NR
5	NR	NR	0.0	NR	NR
Average	4,470	1,072		212.7	51.03

P - Periodic discharge
NR - Data not reported

*Discharge from operation.

Table V-250

METAL POWDERS METAL POWDER PRODUCTION
ATOMIZATION WASTEWATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	125	30.0	0	125	30.0
2	1,450	348	0	1,450	348
	2,240	538	0	2,240	538
3	2,740	656	0	2,740	656
4	6,670	1,600	0	6,670	1,600
5	17,000	4,080	0	17,000	4,080
6	NR	NR	NR	NR	NR

NR - Data not reported

Table V-251

METAL POWDERS METAL POWDER PRODUCTION ATOMIZATION WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
115. arsenic	S-1	2	<0.01	<0.01		
118. cadmium	S-1	2	<0.05	<0.05		
119. chromium (total)	S-1	2	<0.005	1.95		
	T-1	6	<0.01	8.3	0.022	0.026
120. copper	S-1	2	<0.05	1.090		
	T-1	6	0.048	45.000	5.400	0.0044
121. cyanide (total)	S-1	1	<0.01	0.026		
	T-1	1	<0.01		<0.01	<0.01
122. lead	S-1	2	<0.1	0.523		
	T-1	6	<0.005	<0.005	<0.005	0.0054
123. mercury	S-1	2	<0.0002	<0.0002		
124. nickel	S-1	2	<0.200	9.200		
	T-1	6	0.075	81.0	1.600	1.100
128. zinc	S-1	2	<0.05	0.607		
Nonconventional Pollutants						
Acidity	T-1	6	**	**	**	**
Aluminum	S-1	2	<0.2	0.407		
	T-1	6	0.14	0.630	0.110	0.041
Cobalt	S-1	2	<0.1	<0.1		
	T-1	6	<0.01	11.000	0.250	0.240
Fluoride	S-1	2	<0.1	0.14		
	T-1	6	1.01		0.89	0.95
Iron	S-1	2	0.122	1,210		
	T-1	6	0.27	40.000	0.46	0.280
Conventional Pollutants						
Oil and Grease	S-1	1	<1	3.1		
	T-1	1	<0.1;0.4	0.1;1.1	0.1;6.1	0.3;5.1

Table V-251 (Continued)

METAL POWDERS METAL POWDER PRODUCTION ATOMIZATION WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants) (Continued)						
Total Suspended Solids (TSS)	S-1	2	<0.1	2,127		
	T-1	6	1.0	10.0	12.0	
pH (standard units)	S-1	1		8.1-8.2		
	T-1	6	7.7	7.7	7.76	

**Less than detection limit. Detection limit not known.

1. No analyses were performed on the following toxic pollutants: 1-114, 116, 125, 126, 127, and 129.

2. Note that stream code T-1 also appears on the nickel-cobalt metal powder production wet atomization wastewater raw wastewater sampling data table. The wastewater is derived from an operation in both subcategories.

Table V-252

METAL POWDERS TUMBLING, BURNISHING OR CLEANING WASTEWATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0	0
	NR	NR	0	NR	NR
2	27.8	6.67	0	27.8	6.67
3	59.2	14.2	0	59.2	14.2
	173	41.6	0	173	41.6
	446	107	0	446	107
4	83.4	20.0	0	83.4	20.0
5	125	30.0	0	125	30.0
6	174	41.7	0 (+)	156	37.5
7	4,380	1,050	90.9	397	95.2
8	NR	NR	P	397	95.2
	1,660	398	0	1,660	399
9	653	158	0	659	158
10	1,660	397	0 (+)	663	159
11	834	200	0	834	200
12	1,010	243	0	1,010	243
13	1,040	250	0	1,040	250
14	1,240	297	0	1,240	297
	11,400	2,730	0	11,400	2,730
15	1,540	370	0	1,540	370
16	3,270	783	0	3,270	783

Table V-252 (Continued)

METAL POWDERS TUMBLING, BURNISHING OR CLEANING WASTEWATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
17	4,300	1,030	0 (+)	3,840	922
18	6,380	1,530	0	6,380	1,530
	6,960	1,670	0	6,960	1,670
	15,600	3,750	0	15,600	3,750
19	7,760	1,860	0	7,760	1,860
20	16,300	3,920	0	16,300	3,920
21	22,800	5,460	0	22,800	5,460
22	NR	NR	O	NR	NR
	NR	NR	0	NR	NR
	NR	NR	NR	NR	NR
23	NR	NR	0	NR	NR
24	NR	NR	0	NR	NR
25	NR	NR	0	NR	NR
26	NR	NR	NR	NR	NR
	NR	NR	NR	NR	NR
	NR	NR	NR	NR	NR
27	NR	NR	NR	NR	NR
28	NR	NR	NR	NR	NR
29	NR	NR	NR	NR	NR

NR - Data not reported
\+ - Loss due to drag-out

Table V-253

METAL POWDERS TUMBLING, BURNISHING, OR CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
4. benzene	J-2	1	ND	0.033	ND	ND
	J-3	1	ND	ND	ND	0.002
	J-4	1	ND	ND	ND	ND
6. carbon tetrachloride	J-2	1	ND	0.005	ND	ND
	J-3	1	ND	0.012	ND	0.016
	J-4	1	ND	0.011	0.008	0.010
11. 1,1,1-trichloroethane	J-2	1	ND	0.003	ND	ND
	J-3	1	ND	0.034	ND	0.071
	J-4	1	ND	0.030	0.024	0.033
23. chloroform	J-2	1	0.027	ND	ND	ND
	J-3	1	0.027	ND	ND	ND
	J-4	1	0.027	ND	ND	ND
44. methylene chloride	J-2	1	ND	0.010	ND	ND
	J-3	1	ND	ND	ND	ND
	J-4	1	ND	0.018	ND	0.008
48. dichlorobromomethane	J-2	1	0.004	ND	ND	ND
	J-3	1	0.004	ND	ND	ND
	J-4	1	0.004	ND	ND	ND
86. toluene	J-2	1	ND	0.013	ND	ND
	J-3	1	ND	ND	ND	ND
	J-4	1	ND	ND	ND	ND
114. antimony	J-2	1	<0.010	<0.010	<0.010	<0.010
	J-3	2	<0.010	0.010	0.060	<0.010
	J-4	6	<0.010	<0.010	<0.010	<0.010
115. arsenic	J-2	1	<0.010	<0.010	<0.010	<0.010
	J-3	2	<0.010	0.010	0.100	<0.010
	J-4	6	<0.010	<0.010	<0.010	<0.010
117. beryllium	J-2	1	<0.005	<0.005	<0.005	<0.005
	J-3	2	<0.005	<0.005	<0.050	<0.005
	J-4	6	<0.005	<0.005	<0.005	<0.005
118. cadmium	J-2	1	<0.020	<0.020	<0.020	<0.020
	J-3	2	<0.020	<0.020	<0.200	<0.020
	J-4	6	<0.020	<0.020	<0.020	<0.020

Table V-253 (Continued)

METAL POWDERS TUMBLING, BURNISHING, OR CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
119. chromium (total)	J-2	1	<0.020	<0.020	<0.020	<0.020
	J-3	2	<0.020	0.080	0.200	0.060
	J-4	6	<0.020	0.160	0.180	0.060
120. copper	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	253	16.5	5.50
	J-4	6	<0.050	34.0	21.2	10.5
121. cyanide (total)	J-2	1	<0.02	0.11	<0.02	<0.02
	J-3	1	<0.02	0.04	0.39	0.15
	J-4	1	<0.02	1.8	1.6	0.10
122. lead	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	45.1	2.00	1.00
	J-4	6	<0.050	5.20	3.15	7.50
123. mercury	J-2	1	<0.0002	<0.0002	<0.0002	<0.0002
	J-3	2	<0.0002	<0.0002	<0.0002	<0.0002
	J-3	6	<0.0002	<0.0002	<0.0002	<0.0002
124. nickel	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	0.500	3.00	2.65
	J-4	6	<0.050	0.600	0.550	0.400
125. selenium	J-2	1	<0.010	<0.010	<0.010	<0.010
	J-3	2	<0.010	<0.010	<0.020	<0.010
	J-4	6	<0.010	<0.010	<0.010	<0.010
126. silver	J-2	1	<0.010	<0.010	<0.010	<0.010
	J-3	2	<0.010	<0.010	<0.010	<0.010
	J-4	6	<0.010	<0.010	<0.010	<0.010
127. thallium	J-2	1	<0.010	<0.010	<0.010	<0.010
	J-3	2	<0.010	<0.010	<0.010	<0.010
	J-4	6	<0.010	<0.010	<0.010	<0.010
128. zinc	J-2	1	0.080	0.100	0.080	<0.060
	J-3	2	<0.050	1.18	9.56	0.890
	J-4	6	<0.080	0.600	0.620	0.480

Table V-253 (Continued)

METAL POWDERS TUMBLING, BURNISHING, OR CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	J-2	1	<1	<1	<1	<1
	J-3	2	<1	<1	<1	<1
	J-4	6	<1	<1	<1	<1
Alkalinity	J-2	1	13	12	43	11
	J-3	2	13	510	4,500	1,300
	J-4	6	13	810	730	880
Aluminum	J-2	1	0.300	0.200	0.300	0.300
	J-3	2	0.300	34.3	33.0	11.9
	J-4	6	0.300	18.5	28.0	19.6
Ammonia Nitrogen	J-2	1	0.16	0.06	0.07	0.7
	J-3	2	0.16	0.90	0.74	0.18
	J-4	6	0.16	1.9	1.5	1.1
Barium	J-2	1	0.050	0.050	0.050	0.050
	J-3	2	0.050	0.200	0.500	0.100
	J-4	6	0.050	0.150	0.200	0.150
Boron	J-2	1	<0.100	<0.100	<0.100	<0.100
	J-3	2	<0.100	58.7	440	4.00
	J-4	6	<0.100	61.7	35.4	56.1
Calcium	J-2	1	10.4	9.80	9.40	10.0
	J-3	2	10.4	17.9	13.0	12.0
	J-4	6	10.4	11.6	11.0	11.3
Chemical Oxygen Demand (COD)	J-2	1	70	370	4,500	2,500
	J-3	2	70	450	7,900	19.0
	J-4	6	70	390	8,100	6,600
Chloride	J-2	1	<1	<1	<1	<1
	J-3	2	<1	14	44	<1
	J-4	6	<1	11	9	<1
Cobalt	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	<0.050	<0.500	<0.050
	J-4	6	<0.050	<0.050	<0.050	<0.050
Fluoride	J-2	1	1.2	1.0	1.1	1.2
	J-3	2	1.2	1.1	1.1	1.1
	J-4	6	1.2	2.1	1.1	1.2

Table V-253 (Continued)

METAL POWDERS TUMBLING, BURNISHING, OR CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	J-2	1	0.100	0.100	0.300	0.100
	J-3	2	0.100	49.2	211	50.1
	J-4	6	0.100	94.2	115	68.8
Magnesium	J-2	1	1.40	1.40	1.30	1.40
	J-3	2	1.40	3.20	4.00	1.80
	J-4	6	1.40	9.30	8.30	5.20
Manganese	J-2	1	0.200	<0.050	<0.050	0.100
	J-3	2	0.200	0.450	0.500	0.300
	J-4	6	0.200	1.00	0.650	0.600
Molybdenum	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	<0.050	0.100	<0.050
	J-4	6	<0.050	0.400	0.500	0.600
Phenolics	J-2	1	<0.005	3.6	33	3.9
	J-3	1	<0.005	2.1	0.33	<0.005
	J-4	1	<0.005	0.96	0.56	0.56
Phosphate	J-2	1	<0.5	<1	<1	<0.4
	J-3	2	<0.5	1,200	<1	45
	J-4	6	<0.5	130	80	120
Sodium	J-2	1	111	2.30	10.7	2.30
	J-3	2	111	288	1,820	1,670
	J-4	6	111	278	390	440
Sulfate	J-2	1	90	600	1,500	1,350
	J-3	2	90	2,400	1,500	11,000
	J-4	6	90	2,400	4,500	1,500
Tin	J-2	1	<0.050	<0.050	<0.050	0.100
	J-3	2	<0.050	15.8	4.50	0.150
	J-4	6	<0.050	3.40	1.75	0.350
Titanium	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	1.90	2.50	1.30
	J-4	6	<0.050	1.20	1.40	0.900
Total Dissolved Solids (TDS)	J-2	1	76	1,500	3,050	52
	J-3	2	76	1,740	1,800	8,800
	J-4	6	76	2,500	2,000	2,900

Table V-253 (Continued)

METAL POWDERS TUMBLING, BURNISHING, OR CLEANING WASTEWATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Organic Carbon (TOC)	J-2	1	3	50	600	98
	J-3	2	3	300	820	1,850
	J-4	6	3	2,600	3,600	3,620
Total Solids (TS)	J-2	1	123	1,600	3,940	410
Vanadium	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	0.100	<0.500	<0.050
	J-4	6	<0.050	<0.050	0.050	<0.050
Yttrium	J-2	1	<0.050	<0.050	<0.050	<0.050
	J-3	2	<0.050	<0.050	<0.500	<0.050
	J-4	6	<0.050	<0.050	<0.050	<0.050
Conventional Pollutants						
Oil and Grease	J-2	1	<1	850	2,100	520
	J-3	1	<1	88	22	4
	J-4	1	<1		27	6
Total Suspended Solids (TSS)	J-2	1	42	99	144	390
	J-3	2	42	1,300	874	3,000
	J-4	6	42	260	1,370	900
pH (standard units)	J-2	1	2.71	6.50	7.60	6.20
	J-3	2	2.71	9.41	8.93	9.10
	J-4	6	2.71	9.60	9.21	9.10

1. The following toxic pollutants were not detected in this waste stream: 1-3, 5, 7-10, 12-22, 24-43, 45-47, 49-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-254

METAL POWDERS SAWING OR GRINDING
SPENT NEAT OILS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	NR	6.17 (CH)	1.48 (CH)

NR - Data not reported
CH - Contract haul

Table V-255

METAL POWDERS SAWING OR GRINDING
SPENT EMULSIONS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	4,590	1,100	0 (+)	0	0
2	NR	NR	P	4.63	1.11
3	NR	NR	P	6.13	1.47
	NR	NR	P	26.7	6.40
4	NR	NR	P	11.8	2.83
	59,200	14,200	P	41.1	9.85
5	550	132	0 (+)	221	52.9

NR - Data not reported
\+ - Loss due to drag-out
P - Periodic discharge

Table V-256

METAL POWDERS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
6. carbon tetrachloride	J-5	1	ND	0.015		
	J-6	1	ND	ND		
11. 1,1,1-trichloroethane	J-5	1	ND	0.055		
	J-6	1	ND	0.019		
23. chloroform	J-5	1	0.027	ND		
	J-6	1	0.027	ND		
48. dichlorobromomethane	J-5	1	0.004	ND		
	J-6	1	0.004	ND		
86. toluene	J-5	1	ND	0.007		
	J-6	1	ND	0.002		
114. antimony	J-5	1	<0.010	<0.010		
	J-6	1	<0.010	<0.010		
115. arsenic	J-5	1	<0.010	<0.010		
	J-6	1	<0.010	<0.200		
117. beryllium	J-5	1	<0.005	<0.005		
	J-6	1	<0.005	<0.050		
118. cadmium	J-5	1	<0.020	<0.020		
	J-6	1	<0.020	<0.200		
119. chromium (total)	J-5	1	<0.020	0.080		
	J-6	1	<0.020	<0.200		
120. copper	J-5	1	<0.050	1.55		
	J-6	1	<0.050	<0.500		
121. cyanide (total)	J-5	1	<0.02	2.5		
	J-6	1	<0.02	<0.02		
122. lead	J-5	1	<0.050	0.200		
	J-6	1	<0.050	<0.500		
123. mercury	J-5	1	<0.0002	<0.002		
	J-6	1	<0.0002	<0.002		
124. nickel	J-5	1	<0.050	0.150		
	J-6	1	<0.050	<0.500		

Table V-256 (Continued)

METAL POWDERS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
125. selenium	J-5	1	<0.010	<0.010		
	J-6	1	<0.010	<0.100		
126. silver	J-5	1	<0.010	<0.010		
	J-6	1	<0.010	<0.010		
127. thallium	J-5	1	<0.010	<0.010		
	J-6	1	<0.010	0.010		
128. zinc	J-5	1	0.080	3.26		
	J-6	1	0.080	1.56		
Nonconventional Pollutants						
Acidity	J-5	1	<1	<1		
	J-6	1	<1	4.30		
Alkalinity	J-5	1	13	1,920		
	J-6	1	13	<1		
Aluminum	J-5	1	0.300	1.60		
	J-6	1	0.300	7.00		
Ammonia Nitrogen	J-5	1	0.16	0.16		
	J-6	1	0.16	5.5		
Barium	J-5	1	0.050	0.050		
	J-6	1	0.050	0.500		
Boron	J-5	1	<0.100	0.400		
	J-6	1	<0.100	166		
Calcium	J-5	1	10.4	15.7		
	J-6	1	10.4	22.0		
Chemical Oxygen Demand (COD)	J-5	1	70	7,000		
	J-6	1	70	24,000		
Chloride	J-5	1	<1	<1		
	J-6	1	<1	91		

Table V-256 (Continued)

METAL POWDERS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Cobalt	J-5	1	<0.050	0.100		
	J-6	1	<0.050	<0.500		
Fluoride	J-5	1	1.2	2.2		
	J-6	1	1 2	8.3		
Iron	J-5	1	0.100	16.2		
	J-6	1	0.100	176		
Magnesium	J-5	1	1.40	2.70		
	J-6	1	1.40	3.00		
Manganese	J-5	1	0.200	0.800		
	J-6	1	0.200	4.00		
Molybdenum	J-5	1	<0.050	<0.050		
	J-6	1	<0.050	<0.500		
Phenolics	J-5	1	<0.005	45		
	J-6	1	<0.005	120		
Phosphate	J-5	1	<0.5	10		
	J-6	1	<0.5	15		
Sodium	J-5	1	111	1,010		
	J-6	1	111	2,150		
Sulfate	J-5	1	90	6,000		
	J-6	1	90	12,000		
Tin	J-5	1	<0.050	<0.050		
	J-6	1	<0.050	<0.500		
Titanium	J-5	1	<0.050	<0.050		
	J-6	1	<0.050	<0.500		
Total Dissolved Solids (TDS)	J-5	1	76	3,400		
	J-6	1	76	9,900		
Total Organic Carbon (TOC)	J-5	1	3	2,600		
	J-6	1	3	9,300		
Total Solids (TS)	J-5	1	125	5,000		
	J-6	1	125	10,000		

Table V-256 (Continued)

METAL POWDERS SAWING OR GRINDING SPENT EMULSIONS
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	J-5	1	<0.050	<0.050		
	J-6	1	<0.050	<0.500		
Yttrium	J-5	1	<0.050	<0.050		
	J-6	1	<0.050	<0.500		
Conventional Pollutants						
Oil and Grease	J-5	1	<1	720		
	J-6	1	<1	2		
Total Suspended Solids (TSS)	J-5	1	42	92		
	J-6	1	42	120		
pH (standard units)	J-5	1	2.71	9.13		
	J-6	1	2.71	2.80		

1. The following toxic pollutants were not detected in this waste stream: 1-5, 7-10, 12-22, 24-47, 49-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-257

METAL POWDERS SAWING OR GRINDING
CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	162,000	38,900	0	162,000	38,900
2	NR	NR	NR	NR	NR
	NR	NR	NR	NR	NR
	NR	NR	NR	NR	NR

NR - Data not reported

Table V-258

METAL POWDERS SAWING OR GRINDING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AH-3		-	0.028		
118. cadmium	AH-3		-	<0.050		
119. chromium (total)	AH-3		-	<0.030		
120. copper	AH-3		-	230.000		
122. lead	AH-3		-	<0.500		
124. nickel	AH-3		-	0.310		
128. zinc	AH-3		-	0.910		
Nonconventional Pollutants						
Aluminum	AH-3		-	40.00		
Iron	AH-3		-	0.800		
Magnesium	AH-3		-	11.00		
Manganese	AH-3		-	0.320		
Tin	AH-3			0.360		

1. No analyses were performed for the following toxic pollutants: 1-116, 121, 123, 125, 127 and 129.

Table V-259

METAL POWDERS SIZING SPENT NEAT OILS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0 (+)	0 (+)
2	NR	NR	100	0 (+)	0 (+)

NR - Data not reported
 \+ - Loss due to evaporation and drag-out

Table V-260

METAL POWDERS SIZING SPENT EMULSIONS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	14.6	3.50	100	0 (+)	0 (+)

+ - Loss due to evaporation and drag-out

Table V-261

METAL POWDERS STEAM TREATMENT WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	792	190	0	792	190

Table V-262

METAL POWDERS STEAM TREATMENT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
4. benzene	J-1	1	ND	0.004	ND	0.003
6. carbon tetrachloride	J-1	1	ND	ND	0.005	0.006
11. 1,1,1-trichloroethane	J-1	1	ND	0.007	0.005	0.006
23. chloroform	J-1	1	0.027	ND	ND	ND
44. methylene chloride	J-1	1	ND	0.008	0.005	ND
48. dichlorobromomethane	J-1	1	0.004	ND	ND	ND
86. toluene	J-1	1	ND	0.002	0.004	0.002
114. antimony	J-1	6	<0.010	<0.010	<0.010	<0.010
115. arsenic	J-1	6	<0.010	<0.010	<0.010	<0.010
117. beryllium	J-1	6	<0.005	<0.005	<0.005	<0.005
118. cadmium	J-1	6	<0.020	<0.020	<0.020	<0.020
119. chromium (total)	J-1	6	<0.020	<0.020	<0.020	<0.020
120. copper	J-1	6	<0.050	<0.050	<0.050	<0.050
121. cyanide (total	J-1	1	<0.02	0.13	<0.02	0.03
122. lead	J-1	6	<0.050	<0.050	<0.050	<0.050
123. mercury	J-1	6	<0.0002	<0.0002	<0.0002	<0.0002
124. nickel	J-1	6	<0.050	<0.050	<0.050	<0.050
125. selenium	J-1	6	<0.010	<0.010	<0.010	<0.010
126. silver	J-1	6	<0.010	<0.010	<0.010	<0.010
127. thallium	J-1	6	<0.010	<0.010	<0.010	<0.010
128. zinc	J-1	6	0.080	0.040	0.030	0.020

Table V-262 (Continued)

METAL POWDERS STEAM TREATMENT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants						
Acidity	J-1	6	<1	<1	<1	<1
Alkalinity	J-1	6	13	10	10	8.6
Aluminum	J-1	6	0.300	0.200	0.300	0.300
Ammonia Nitrogen	J-1	6	0.16	0.64	0.47	0.7
Barium	J-1	6	0.050	0.050	0.050	0.050
Boron	J-1	6	<0.100	<0.100	<0.100	<0.100
Calcium	J-1	6	10.4	10.7	11.2	10.9
Chemical Oxygen Demand (COD)	J-1	6	70	380	84	540
Chloride	J-1	6	<1	110	8	8
Cobalt	J-1	6	<0.050	<0.050	<0.050	<0.050
Fluoride	J-1	6	1.2	1.0	1.3	1.2
Iron	J-1	6	0.100	0.100	0.150	0.050
Magnesium	J-1	6	1.40	1.50	1.50	1.50
Manganese	J-1	6	0.200	<0.050	<0.050	0.100
Molybdenum	J-1	6	<0.050	<0.050	<0.050	<0.050
Phenolics	J-1	1	0.005	23	33	30
Phosphate	J-1	6	<0.5	8	<1	<0.5
Sodium	J-1	6	111	2.40	2.60	2.40
Sulfate	J-1	6	90	1,600	2,700	75
Tin	J-1	6	<0.050	<0.050	<0.050	<0.050
Titanium	J-1	6	<0.050	<0.050	<0.050	<0.050
Total Dissolved Solids (TDS)	J-1	6	76	170	65	99

Table V-262 (Continued)

METAL POWDERS STEAM TREATMENT WET AIR POLLUTION CONTROL BLOWDOWN
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Organic Carbon (TOC)	J-1	6	3	15	27	16
Total Solids (TS)	J-1	6	125	180	134	350
Vanadium	J-1	6	<0.050	<0.050	<0.050	<0.050
Yttrium	J-1	6	<0.050	<0.050	<0.050	<0.050
Conventional Pollutants						
Oil and Grease	J-1	1	<1	35	42	31
Total Suspended Solids (TSS)	J-1	6	42	15	80	200
pH (standard units)	J-1	6	2.71	5.81	6.21	6.00

1. The following toxic pollutants were not detected in this waste stream: 1-3, 5, 7-10, 12-22, 24-43, 45-47, 49-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-263

METAL POWDERS OIL-RESIN IMPREGNATION
SPENT NEAT OILS

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	NR	NR	100	0 (+)	0 (+)
2	NR	NR	100	0 (+)	0 (+)
3	NR	NR	NR	10.9 (CH)	2.61 (CH)
4	36.8	8.83	0	36.8 (CH)	8.83 (CH)
5	NR	NR	NR	NR (CH)	NR (CH)
6	NR	NR	NR	NR	NR
7	NR	NR	NR	NR	NR

NR - Data not reported
\+ - Loss due to evaporation and drag-out
CH - Contract hauled

Table V-264

METAL POWDERS HOT PRESSING
CONTACT COOLING WATER

Plant	Water Use l/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge l/kkg	Wastewater Discharge gal/ton
1	8,800	2,110	0	8,800	2,110

Table V-265

METAL POWDERS HOT PRESSING CONTACT COOLING WATER
RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AH-2		-	0.002		
118. cadmium	AH-2		-	<0.005		
119. chromium (total)	AH-2		-	0.010		
120. copper	AH-2		-	2.200		
122. lead	AH-2		-	<0.050		
124. nickel	AH-2		-	0.043		
128. zinc	AH-2		-	0.079		
Nonconventional Pollutants						
Aluminum	AH-2		-	0.490		
Cobalt	AH-2		-	0.008		
Iron	AH-2		-	5.300		
Magnesium	AH-2		-	3.500		
Tin	AH-2		-	0.046		
Titanium	AH-2		-	0.011		
Vanadium	AH-2		-	0.006		

1. No analyses were performed for the following toxic pollutant: 1-116, 121, 123, 125-127 and 129.

Table V-266

METAL POWDERS MIXING WET AIR POLLUTION CONTROL BLOWDOWN

Plant	Water Use 1/kkg	Water Use gal/ton	Percent Recycle	Wastewater Discharge 1/kkg	Wastewater Discharge gal/ton
1	79,000	18,900	90	7,900	1,890

Table V-267

METAL POWDERS MIXING WET AIR POLLUTION CONTROL BLOWDOWN RAW WASTEWATER SAMPLING DATA

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
117. beryllium	AH-1		-	<0.001		
118. cadmium	AH-1		-	<0.005		
119. chromium (total)	AH-1		-	<0.003		
120. copper	AH-1		-	1.200		
122. lead	AH-1		-	<0.050		
124. nickel	AH-1		-	<0.012		
128. zinc	AH-1		-	0.031		
Nonconventional Pollutants						
Aluminum	AH-1		-	0.058		
Iron	AH-1		-	0.570		
Magnesium	AH-1		-	4.500		
Manganese	AH-1		-	0.300		
Molybdenum	AH-1		-	<0.020		
Titanium	AH-1		-	<0.010		

1. No analyses were performed for the following toxic pollutants: 1-116, 121, 123, 125-127, and 129.

Table V-268

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT A

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	A-4	3	<0.003	0.021	0.017	
	A-5	4	<0.003	0.044	0.060	
115. arsenic	A-4	3	<0.003	0.017	0.006	
	A-5	4	<0.003	0.043	0.037	
117. beryllium	A-4	3	<0.0005	<0.0005	<0.0005	
	A-5	4	<0.0005	<0.0005	<0.0005	
118. cadmium	A-4	3	<0.002	0.009	<0.002	
	A-5	4	<0.002	0.007	0.003	
119. chromium (total)	A-4	3	<0.001	0.66	0.51	
	A-5	4	<0.001	<0.001	<0.001	
120. copper	A-4	3	<0.001	0.2	0.089	
	A-5	4	<0.001	0.023	0.012	
122. lead	A-4	3	<0.084	4.8	4.3	
	A-5	4	<0.084	<0.084	<0.084	
124. nickel	A-4	3	<0.003	0.47	0.39	
	A-5	4	<0.003	0.31	0.35	
128. zinc	A-4	3	0.72	2.8	0.34	
	A-5	4	0.72	0.15	<0.003	
Nonconventional Pollutants						
Aluminum	A-4	3	<0.050	0.87	0.54	
	A-5	4	<0.050	<0.050	<0.050	
Barium	A-4	3	0.15	0.060	0.055	
	A-5	4	0.15	0.029	0.049	
Boron	A-4	3	<0.009	1.7	1.2	
	A-5	4	<0.009	1.8	1.4	
Calcium	A-4	3	69	91	62	
	A-5	4	69	73	75	
Cobalt	A-4	3	<0.006	<0.006	<0.006	
	A-5	4	<0.006	0.009	<0.006	

Table V-268 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT A

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	A-4	3	<0.008	23	18	
	A-5	4	<0.008	<0.008	<0.008	
Magnesium	A-4	3	27	34	24	
	A-5	4	27	29	30	
Manganese	A-4	3	<0.001	0.23	0.17	
	A-5	4	<0.001	0.10	0.13	
Molybdenum	A-4	3	<0.002	0.011	<0.002	
	A-5	4	<0.002	0.037	0.015	
Sodium	A-4	3	10	540	330	
	A-5	4	10	3,000	2,700	
Tin	A-4	3	<0.12	<0.12	<0.12	
	A-5	4	<0.12	<0.12	<0.12	

Table V-268 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT A

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	A-4	3	<0.005	<0.005	<0.005	
	A-5	4	<0.005	0.013	<0.005	
Vanadium	A-4	3	<0.003	<0.003	<0.003	
	A-5	4	<0.003	0.028	<0.003	
Yttrium	A-4	3	<0.002	<0.002	<0.002	
	A-5	4	<0.002	0.003	<0.002	
Conventional Pollutants						
Oil and Grease	A-4	1	<1	<1	<1	
	A-5	1	<1	<1	<1	
Total Suspended Solids (TSS)	A-4	3	23	26	26	
	A-5	4	23	33	25	
pH (standard units)	A-4		6.5	1.40	1.31	
	A-5		6.5	NA	7.11	

NA - Not Analyzed.

Footnote: No analyses were performed on the following toxic pollutants: 1 - 113, 116, 121, 123, 125-127, and 129.

Table V-269

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT B

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
6. carbon tetrachloride	B-7	1	ND	ND	ND	0.013
	B-8	1	ND	ND	ND	0.012
11. 1,1,1-trichloroethane	B-7	1	0.003	ND	0.003	0.045
	B-8	1	0.003	0.004	ND	0.037
23. chloroform	B-7	1	ND	ND	0.005	0.005
	B-8	1	ND	0.005	0.005	0.006
26. 1,3-dichlorobenzene	B-7	6	0.039	ND	ND	ND
	B-8	6	0.039	ND	ND	ND
38. ethylbenzene	B-7	1	ND	0.054	0.027	0.032
	B-8	1	ND	0.018	0.015	0.039
44. methylene chloride	B-7	1	ND	0.105	0.017	0.017
	B-8	1	ND	0.027	0.014	0.021
62. N-nitrosodiphenylamine	B-7	6	ND	ND	ND	0.013
	B-8	6	ND	ND	ND	ND
65. phenol	B-7	6	ND	0.014	ND	ND
	B-8	6	ND	ND	ND	ND
66. bis(2-ethylhexyl) phthalate	B-7	6	ND	0.021	ND	0.023
	B-8	6	ND	ND	0.015	ND
72. benzo(a)anthracene	B-7	6	0.061	ND	ND	ND
	B-8	6	0.061	ND	ND	ND
86. toluene	B-7	1	ND	0.046	0.046	0.084
	B-8	1	ND	0.020	0.025	0.096
114. antimony	B-7	6	<0.010	0.040	0.090	0.040
	B-8	6	<0.010	0.010	0.030	0.050
115. arsenic	B-7	6	<0.010	0.020	0.020	0.030
	B-8	6	<0.010	<0.010	<0.010	0.010
117. beryllium	B-7	6	<0.005	<0.005	<0.005	<0.005
	B-8	6	<0.005	<0.005	<0.005	<0.005
118. cadmium	B-7	6	<0.020	<0.020	<0.020	<0.020
	B-8	6	<0.020	<0.020	<0.020	<0.020

Table V-269 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT B

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
119. chromium (total)	B-7	6	<0.020	0.860	0.980	0.780
	B-8	6	<0.020	0.120	0.160	0.100
120. copper	B-7	6	<0.050	1.35	2.00	3.35
	B-8	6	<0.050	0.250	0.250	0.600
121. cyanide (total)	B-7	1	<0.02	<0.02	0.18	0.34
	B-8	1	<0.02	<0.02	0.21	0.82
122. lead	B-7	6	<0.050	1.85	3.45	2.70
	B-8	6	<0.050	0.450	0.450	0.300
123. mercury	B-7	6	<0.0002	<0.0002	<0.0002	<0.0002
	B-8	6	<0.0002	<0.0002	<0.0002	<0.0002
124. nickel	B-7	6	<0.050	0.200	0.100	0.100
	B-8	6	<0.050	0.050	0.050	0.100
125. selenium	B-7	6	<0.010	<0.010	<0.010	<0.010
	B-8	6	<0.010	<0.010	<0.010	<0.010
126. silver	B-7	6	<0.010	<0.010	<0.010	<0.010
	B-8	6	<0.010	<0.010	<0.010	<0.010
127. thallium	B-7	6	<0.010	<0.010	<0.010	<0.010
	B-8	6	<0.010	<0.010	<0.010	<0.020
128. zinc	B-7	6	<0.020	2.22	2.88	3.88
	B-8	6	<0.020	0.460	0.440	0.400
Nonconventional Pollutants						
Acidity	B-7	6	<1	<1	<1	<1
	B-8	6	<1	<1	<1	<1
Alkalinity	B-7	6	240	230	250	190
	B-8	6	240	200	200	200
Aluminum	B-7	6	<0.100	1.20	0.800	0.500
	B-8	6	<0.100	0.200	0.200	0.100
Ammonia Nitrogen	B-7	6	<1	[illegible]	6.3	6.3
	B-8	6	<1	6	7	5.8

Table V-269 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT B

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Barium	B-7	6	<0.050	1.85	3.20	2.70
	B-8	6	<0.050	0.300	0.400	0.300
Boron	B-7	6	<0.100	0.700	0.800	1.00
	B-8	6	<0.100	0.600	0.700	0.900
Calcium	B-7	6	62.0	47.1	55.4	57.1
	B-8	6	62.0	71.5	64.2	57.8
Chemical Oxygen Demand (COD)	B-7	6	<5	490	280	440
	B-8	6	<5	330	310	460
Chloride	B-7	6	6	67	81	91
	B-8	6	6	62	70	79
Cobalt	B-7	6	<0.050	<0.050	<0.050	<0.050
	B-8	6	<0.050	<0.050	<0.050	<0.050
Fluoride	B-7	6	1.2	2.6	5.1	0.47
	B-8	6	1.2	2.4	3.3	0.97
Iron	B-7	6	1.00	4.50	3.90	4.15
	B-8	6	1.00	0.850	0.750	0.650
Magnesium	B-7	6	19.7	15.5	17.2	18.5
	B-8	6	19.7	14.7	13.9	13.2
Manganese	B-7	6	0.100	0.200	0.150	0.150
	B-8	6	0.100	<0.050	<0.050	<0.050
Molybdenum	B-7	6	<0.050	0.150	0.200	0.300
	B-8	6	<0.050	0.100	0.150	0.250
Phenolics	B-7	1	0.010	0.021	0.020	0.030
	B-8	1	0.010	0.031	0.034	0.030
Phosphate	B-7	6	56	92	130	170
	B-8	6	56	19	<4	9.6
Sodium	B-7	6	6.80	108	127	149
	B-8	6	6.80	98.5	119	134
Sulfate	B-7	6	7.8	67	72	72
	B-8	6	7.8	180	160	120

Table V-269 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT B

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Tin	B-7	6	<0.050	<0.050	<0.050	<0.050
	B-8	6	<0.050	<0.050	<0.050	<0.050
Titanium	B-7	6	<0.050	0.100	0.050	<0.050
	B-8	6	<0.050	<0.050	<0.050	<0.050
Total Dissolved Solids (TDS)	B-7	6	390	320	730	700
	B-8	6	390	300	730	620
Total Organic Carbon (TOC)	B-7	6	12	150	120	110
	B-8	6	12	110	130	130
Total Solids (TS)	B-7	6	490	790	1,100	1,030
	B-8	6	490	660	1,000	860
Vanadium	B-7	6	<0.050	<0.050	<0.050	<0.050
	B-8	6	<0.050	<0.050	<0.050	<0.050
Yttrium	B-7	6	<0.050	<0.050	<0.050	<0.050
	B-8	6	<0.050	<0.050	<0.050	<0.050
Conventional Pollutants						
Oil and Grease	B-7	1	15	36	40	36
	B-8	1	15	10	10	13
Total Suspended Solids (TSS)	B-7	6	110	490	210	210
	B-8	6	110	340	48	200
pH (Standard Units)	B-7	6	7.43	6.70	6.53	6.53
	B-8	6	7.43	6.80	6.63	6.81

Footnote:

1. The following toxic pollutants were not detected at this plant: 1-5, 7-10, 12-22, 24, 25, 27-37, 39-43, 45-61, 63, 64, 67-71, 73-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-270

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT D

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	D-20	1	0.009	0.007	0.006	0.008
	D-21	1	0.009	0.013	0.008	0.014
22. p-chloro-m-cresol	D-20	6	ND	ND	ND	ND
	D-21	6	ND	ND	ND	0.375
23. chloroform	D-20	1	0.144	0.001	ND	0.002
	D-21	1	0.144	0.013	0.012	0.011
34. 2,4-dimethylphenol	D-20	6	ND	ND	ND	0.028
	D-21	6	ND	0.048	ND	ND
44. methylene chloride	D-20	1	0.002	0.001	0.002	0.007
	D-21	1	0.002	0.002	0.003	0.012
66. bis(2-ethylhexyl) phthalate	D-20	6	0.009	1.260	ND	ND
	D-21	6	0.009	ND	ND	ND
81. phenanthrene	D-20	6	ND	ND	ND	0.002
	D-21	6	ND	ND	ND	ND
86. toluene	D-20	1	ND	ND	ND	0.002
	D-21	1	ND	ND	ND	ND
114. antimony	D-20	6	<0.003	<0.003	<0.003	<0.003
	D-21	6	<0.003	<0.003	<0.003	<0.003
115. arsenic	D-20	6	<0.003	<0.003	<0.003	<0.003
	D-21	6	<0.003	<0.003	<0.003	<0.003
117. beryllium	D-20	6	<0.0005	<0.0005	<0.0005	<0.0005
	D-21	6	<0.0005	<0.005	0.002	<0.0005
118. cadmium	D-20	6	<0.002	7.3	5.3	7.6
	D-21	6	<0.002	0.051	0.017	0.002
119. chromium (total)	D-20	6	0.042	718	120	160
	D-21	6	0.042	0.83	0.20	0.18
120. copper	D-20	6	0.068	4.8	3.5	5.1
	D-21	6	0.068	0.40	0.050	0.029
121. cyanide (total)	D-20	1	<0.02	0.41	1.5	1.6
	D-21	1	<0.02	0.11	0.51	0.33

Table V-270 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT D

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
122. lead	D-20	6	<0.084	0.72	0.66	0.80
	D-21	6	<0.084	<0.084	0.19	<0.084
123. mercury	D-20	6	<0.0002	<0.0002	<0.0002	<0.0002
	D-21	6	<0.0002	<0.0002	<0.0002	<0.0002
124. nickel	D-20	6	<0.003	340	300	340
	D-21	6	<0.003	3.5	0.82	0.83
125. selenium	D-20	6	<0.003	<0.003	<0.003	<0.003
	D-21	6	<0.003	<0.003	<0.003	<0.003
126. silver	D-20	6	<0.001	0.013	0.012	0.020
	D-21	6	<0.001	0.008	0.008	0.008
127. thallium	D-20	6	<0.003	<0.003	<0.003	0.020
	D-21	6	<0.003	<0.003	<0.003	<0.003
128. zinc	D-20	6	0.038	1.9	1.4	2.0
	D-21	6	0.038	0.021	0.007	0.014
Nonconventional Pollutants						
Acidity	D-20	6	<1	80	<1	<1
	D-21	6	<1	<1	<1	<1
Alkalinity	D-20	6	180	<1	1,600	1,360
	D-21	6	180	96	111	110
Aluminum	D-20	6	<0.050	32	37	44
	D-21	6	<0.050	0.14	0.15	<0.050
Ammonia Nitrogen	D-20	6	<1	0.15	0.35	0.423
	D-21	6	<1	0.35	1.2	0.44
Barium	D-20	6	0.12	0.83	0.72	0.91
	D-21	6	0.12	0.23	0.22	0.17
Boron	D-20	6	<0.009	14	9.7	14
	D-21	6	<0.009	<0.009	<0.009	<0.009
Calcium	D-20	6	63	1,900	1,600	1,900
	D-21	6	63	960	900	850

Table V-270 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT D

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chemical Oxygen Demand (COD)	D-20	6	<5	130	190	170
	D-21	6	<5	80	110	100
Chloride	D-20	6	34	200	195	160
	D-21	6	34	170	165	160
Cobalt	D-20	6	<0.006	55	38	55
	D-21	6	<0.006	0.34	0.092	0.077
Fluoride	D-20	6	0.45	2.1	0.47	500
	D-21	6	0.45	2.7	0.63	59
Iron	D-20	6	0.066	190	140	210
	D-21	6	0.066	1.2	0.25	0.27
Magnesium	D-20	6	24	43	36	51
	D-21	6	24	20	11	11
Manganese	D-20	6	0.012	5.2	3.8	5.4
	D-21	6	0.012	0.087	0.040	0.041
Molybdenum	D-20	6	0.030	44	35	44
	D-21	6	0.030	19	10	10
Phosphate	D-20	6	<4	21	<4	<4
	D-21	6	<4	<4	<4	<4
Sodium	D-20	6	9.5	770	590	540
	D-21	6	9.5	600	340	320
Sulfate	D-20	6	53	2,200	2,400	2,300
	D-21	6	53	3,600	3,300	4,000
Tin	D-20	6	<0.12	<0.12	<0.12	<0.12
	D-21	6	<0.12	1.5	1.4	0.90
Titanium	D-20	6	<0.005	62	19	85
	D-21	6	<0.005	0.53	0.22	0.11
Total Dissolved Solids (TDS)	D-20	6	393	4,000	5,600	3,900
	D-21	6	393	5,800	5,600	5,400
Total Organic Carbon (TOC)	D-20	6	8	5	46	29
	D-21	6	8	47	22	34

Table V-270 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT D

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Solids (TS)	D-20	6	395	12,000	10,000	5,700
	D-21	6	395	6,200	6,000	5,600
Vanadium	D-20	6	0.016	4.3	3.1	4.6
	D-21	6	0.016	0.056	0.11	0.035
Yttrium	D-20	6	<0.002	0.099	0.043	0.051
	D-21	6	<0.002	0.006	0.020	0.007
Conventional Pollutants						
Oil and Grease	D-20	1	<1	91	120	790
	D-21	1	<1	5	5	10
Total Suspended Solids (TSS)	D-20	6	<1	8,300	5,200	770
	D-21	6	<1	53	30	23
pH (Standard Units)	D-20	6	7.14	3.90	9.02	7.81
	D-21	6	7.14	6.73	6.43	6.47

1. The following toxic pollutants were not detected at this plant: 1-10, 12-21, 24-33, 35-43, 45-65, 67-80, 82-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-271

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
5. benzidine	E-6	3	0.762	0.010	1.159	0.576
	E-7	3	0.762	**	**	0.033
	E-8	1	0.762			0.965
11. 1,1,1-trichloroethane	E-6	1	0.005	0.540	0.720	0.820
	E-7	1	0.005	0.490	0.490	0.960
	E-8	1	0.005			0.020
12. hexachloroethane	E-6	3	ND	ND	0.006	ND
	E-7	3	ND	0.006	0.006	ND
	E-8	1	ND			0.006
13. 1,1-dichloroethane	E-6	1	ND	ND	ND	0.005
	E-7	1	ND	0.040	0.035	0.025
	E-8	1	ND			ND
22. p-chloro-m-cresol	E-6	3	ND	0.680	ND	**
	E-7	3	ND	**	ND	ND
	E-8	1	ND			ND
23. chloroform	E-6	1	0.015	ND	ND	ND
	E-7	1	0.015	ND	0.015	ND
	E-8	1	0.015			ND
27. 1,4-dichlorobenzene	E-6	3	ND	ND	ND	ND
	E-7	3	ND	ND	ND	0.005
	E-8	1	ND			ND
28. 3,3'-dichlorobenzidine	E-6	3	0.001	0.810	0.010	0.019
	E-7	3	0.001	0.001	0.001	0.519
	E-8	1	0.001			ND
34. 2,4-dimethylphenol	E-6	3	ND	**	**	ND
	E-7	3	ND	0.046	0.053	0.046
	E-8	1	ND			ND
36. 2,6-dinitrotoluene	E-6	3	0.002	0.001	0.001	0.001
	E-7	3	0.002	0.002	0.003	0.001
	E-8	1	0.002			0.002
37. 1,2-diphenylhydrazine	E-6	3	0.001	0.001	0.001	0.001
	E-7	3	0.001	0.001	0.001	0.001
	E-8	1	0.001			ND

Table V-271 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
39. fluoranthene	E-6	3	ND	0.001	0.001	0.001
	E-7	3	ND	ND	0.001	ND
	E-8	1	ND			ND
43. bis(2-choroethoxy)methane	E-6	3	0.001	ND	0.001	0.002
	E-7	3	0.001	0.001	0.0002	0.0003
	E-8	1	0.001			0.0001
44. methylene chloride	E-6	1	ND	0.160	ND	ND
	E-7	1	ND	ND	ND	ND
	E-8	1	ND			ND
55. naphthalene	E-6	3	0.001	0.002	0.001	0.002
	E-7	3	0.001	0.001	0.001	0.001
	E-8	1	0.001			0.001
61. N-nitrosodimethylamine	E-6	3	0.001	0.001	0.001	0.001
	E-7	3	0.001	ND	ND	ND
	E-8	1	0.001			0.001
62. N-nitrosodiphenylamine	E-6	3	ND	ND	ND	ND
	E-7	3	ND	ND	ND	ND
	E-8	1	ND			0.196
63. N-nitrosodi-n-propylamine	E-6	3	0.024	0.018	0.021	0.016
	E-7	3	0.024	0.016	0.020	0.032
	E-8	1	0.024			0.023
65. phenol	E-6	3	ND	**	**	**
	E-7	3	ND	**	**	**
	E-8	1	ND			ND
66. bis(2-ethylhexyl) phthalate	E-6	3	0.001	**	0.003	**
	E-7	3	0.001	0.030	0.002	0.001
	E-8	1	0.001			0.002
67. butyl benzyl phthalate	E-6	3	0.001	0.003	0.002	0.005
	E-7	3	0.001	0.004	0.002	0.003
	E-8	1	0.001			0.001
70. diethyl phthalate	E-6	3	<0.00001	ND	0.001	ND
	E-7	3	<0.00001	0.0001	0.0001	ND
	E-8	1	<0.00001			0.0001

Table V-271 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
71. dimethyl phthalate	E-6	3	ND	ND	0.004	ND
	E-7	3	ND	ND	0.001	ND
	E-8	1	ND			0.003
72. benzo(a)anthracene	E-6	3	ND	ND	ND	**
	E-7	3	ND	0.0002	0.0001	ND
	E-8	1	ND			ND
73. benzo(a)pyrene	E-6	3	ND	17.40	ND	ND
	E-7	3	ND	ND	ND	ND
	E-8	1	ND			ND
75. benzo(k)fluoranthene	E-6	3	ND	**	ND	ND
	E-7	3	ND	ND	**	**
	E-8	1	ND			ND
76. chrysene	E-6	3	ND	ND	ND	**
	E-7	3	ND	ND	ND	**
	E-8	1	ND			ND
78. anthracene	E-6	3	ND	0.002	ND	0.002
	E-7	3	ND	ND	0.001	0.001
	E-8	1	ND			ND
81. phenanthrene	E-6	3	ND	ND	0.001	ND
	E-7	3	ND	0.001	0.001	ND
	E-8	1	ND			0.001
83. indeno(1,2,3-c,d)pyrene	E-6	3	ND	ND	ND	0.001
	E-7	3	ND	ND	ND	ND
	E-8	1	ND			ND
84. pyrene	E-6	3	ND	0.001	0.001	0.001
	E-7	3	ND	0.001	0.001	0.001
	E-8	1	ND			ND
86. toluene	E-6	1	ND	ND	ND	ND
	E-7	1	ND	ND	ND	0.015
	E-8	1	ND			ND
114. antimony	E-6	3	<0.005	<0.005	<0.005	<0.005
	E-7	3	<0.005	<0.005	<0.005	<0.005
	E-8	1	<0.005	<0.005		<0.005
	E-9	3	<0.005		<0.005	

Table V-271 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
115. arsenic	E-6	3	<0.005	<0.005	<0.005	<0.005
	E-7	3	<0.005	<0.005	<0.005	<0.005
	E-8	1	<0.005	<0.005		<0.005
	E-9	3	<0.005		<0.005	
117. beryllium	E-6	3	<0.010	<0.010	<0.010	<0.010
	E-7	3	<0.010	<0.010	<0.010	<0.010
	E-8	1	<0.010	<0.010		<0.010
	E-9	3	<0.010		<0.010	
118. cadmium	E-6	3	<0.050	<0.050	<0.050	<0.050
	E-7	3	<0.050	<0.050	<0.050	<0.050
	E-8	1	<0.050	<0.050		<0.050
	E-9	3	<0.050		<0.050	
119. chromium (total)	E-6	3	<0.100	<0.100	<0.100	<0.100
	E-7	3	<0.100	<0.100	<0.100	<0.100
	E-8	1	<0.100	2.15		7.90
	E-9	3	<0.100		<0.100	
120. copper	E-6	3	0.080	0.620	0.180	0.750
	E-7	3	0.080	0.100	0.110	0.080
	E-8	1	0.080	14.0		87.4
	E-9	3	0.080		0.140	
121. cyanide (total)	E-6	1	<0.02	<0.02	<0.02	<0.02
	E-7	1	<0.02	<0.02	<0.02	<0.02
	E-8	1	<0.02	<0.02		<0.02
	E-9	1	<0.02		<0.02	
122. lead	E-6	3	<0.100	0.240	0.220	0.190
	E-7	3	<0.100	0.100	<0.100	0.100
	E-8	1	<0.100	<0.100		<0.100
	E-9	3	<0.100		<0.100	
123. mercury	E-6	3	<0.0010	<0.0010	<0.0010	<0.0010
	E-7	3	<0.0010	<0.0010	<0.0010	<0.0010
	E-8	1	<0.0010	<0.0010		<0.0010
	E-9	3	<0.0010		<0.0010	

Table V-271 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
124. nickel	E-6	3	<0.100	0.510	<0.100	1.30
	E-7	3	<0.100	<0.100	<0.100	0.100
	E-8	1	<0.100	24.6		183
	E-9	3	<0.100		<0.100	
125. selenium	E-6	3	<0.010	<0.010	<0.010	<0.010
	E-7	3	<0.010	<0.010	<0.010	<0.010
	E-8	1	<0.010	<0.010		<0.010
	E-9	3	<0.010		<0.010	
126. silver	E-6	3	<0.002	<0.002	<0.002	<0.002
	E-7	3	<0.002	<0.002	<0.002	<0.002
	E-8	1	<0.002	<0.002		<0.002
	E-9	3	<0.002		<0.002	
127. thallium	E-6	3	<0.002	<0.002	<0.002	<0.002
	E-7	3	<0.002	<0.002	<0.002	<0.002
	E-8	1	<0.002	<0.002		<0.002
	E-9	3	<0.002		<0.002	
128. zinc	E-6	3	<0.050	0.310	0.100	0.240
	E-7	3	<0.050	0.080	0.110	0.080
	E-8	1	<0.050	0.370		1.40
	E-9	3	<0.050		<0.050	
Nonconventional Pollutants						
Acidity	E-6	3	<1	<1	<1	<1
	E-7	3	<1	<1	<1	<1
	E-8	1	<1	130		198
	E-9	3	<1		<1	
Alkalinity	E-6	3	83	120	150	150
	E-7	3	83	230	160	160
	E-8	1	83	<1		<1
	E-9	3	83		250	
Aluminum	E-6	3	0.300	0.800	0.200	0.500
	E-7	3	0.300	0.140	0.160	0.150
	E-8	1	0.300	0.960		<0.020
	E-9	3	0.300		0.040	
Ammonia Nitrogen	E-6	3	0.22	0.19	0.19	0.37
	E-7	3	0.22	0.14	0.14	9.3
	E-8	1	0.22	0.55		130
	E-9	3	0.22		30	

Table V-271 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Barium	E-6	3	0.060	0.120	0.080	0.070
	E-7	3	0.060	0.110	0.100	0.080
	E-8	1	0.060	0.030		0.040
	E-9	3	0.060		<0.020	
Boron	E-6	3	0.170	0.400	0.140	0.460
	E-7	3	0.170	0.590	0.480	0.510
	E-8	1	0.170	0.200		0.470
	E-9	3	0.170		0.100	
Calcium	E-6	3	33.0	34.2	32.8	30.4
	E-7	3	33.0	34.6	36.5	32.5
	E-8	1	33.0	18.4		18.9
	E-9	3	33.0		9.70	
Chemical Oxygen Demand (COD)	E-6	3	34	330	18	890
	E-7	3	34	470	460	460
	E-8	1	34	50		52
	E-9	3	34		<0.05	
Chloride	E-6	3	26	24	24	21
	E-7	3	26	31	29	28
	E-8	1	26	35		78
	E-9	3	26		40	
Cobalt	E-6	3	<0.100	<0.100	<0.100	<0.100
	E-7	3	<0.100	<0.100	<0.100	<0.100
	E-8	1	<0.100	<0.100		<0.100
	E-9	3	<0.100		<0.100	
Fluoride	E-6	3	0.44	0.39	0.69	0.64
	E-7	3	0.44	0.44	0.30	0.75
	E-8	1	0.44	0.40		0.52
	E-9	3	0.44		0.39	
Iron	E-6	3	1.00	3.50	1.60	2.40
	E-7	3	1.00	2.50	2.60	4.40
	E-8	1	1.00	31.0		32.5
	E-9	3	1.00		0.120	
Magnesium	E-6	3	15.8	14.4	15.0	13.3
	E-7	3	15.8	15.6	15.8	13.8
	E-8	1	15.8	6.00		6.20
	E-9	3	15.8		3.00	

Table V-271 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	E-6	3	0.140	0.100	0.080	0.110
	E-7	3	0.140	0.170	0.160	0.140
	E-8	1	0.140	0.630		2.00
	E-9	3	0.140		0.018	
Molybdenum	E-6	3	<0.200	<0.200	<0.200	<0.200
	E-7	3	<0.200	<0.200	<0.200	<0.200
	E-8	1	<0.200	<0.200		<0.200
	E-9	3	<0.200		<0.200	
Phenolics	E-6	1	0.014	8.5	2.4	9.52
	E-7	1	0.014	13	11	13
	E-8	1	0.014	0.016		0.015
	E-9	1	0.014		0.032	
Phosphate	E-6	3	16	21	18	30
	E-7	3	16	23	28	27
	E-8	1	16	<4		<4
	E-9	3	16		13	
Sodium	E-6	3	33.0	71.0	75.0	80.0
	E-7	3	33.0	83.0	80.0	73.0
	E-8	1	33.0	58.0		133
	E-9	3	33.0		292	
Sulfate	E-6	3	170	170	190	190
	E-7	3	170	120	150	130
	E-8	1	170	700		1300
	E-9	3	170		580	
Tin	E-6	3	<0.200	<0.200	<0.200	<0.200
	E-7	3	<0.200	<0.200	<0.200	<0.200
	E-8	1	<0.200	<0.200		<0.200
	E-9	3	<0.200		<0.200	
Titanium	E-6	3	<0.020	<0.020	<0.020	<0.020
	E-7	3	<0.020	<0.020	<0.020	<0.020
	E-8	1	<0.020	0.090		0.150
	E-9	3	<0.020		<0.020	
Total Dissolved Solids (TDS)	E-6	3	330	470	360	580
	E-7	3	330	720	420	590
	E-8	1	330	920		2000
	E-9	3	330		860	

Table V-271 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT E

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Organic Carbon	E-6	3	<1	68	89	110
	E-7	3	<1	110	150	67
	E-8	1	<1	10		3.9
	E-9	3	<1		<1	
Total Solids (TS)	E-6	3	380	590	470	800
	E-7	3	380	830	600	690
	E-8	1	380	930		2070
	E-9	3	380		900	
Vanadium	E-6	3	<0.010	<0.010	<0.010	<0.010
	E-7	3	<0.010	<0.010	<0.010	<0.010
	E-8	1	<0.010	<0.010		<0.010
	E-9	3	<0.010		<0.010	
Yttrium	E-6	3	<0.020	<0.020	<0.020	<0.020
	E-7	3	<0.020	<0.020	<0.020	<0.020
	E-8	1	<0.020	<0.020		<0.020
	E-9	3	<0.020		<0.020	
Conventional Pollutants						
Oil and Grease	E-6	1	<1	350	340	420
	E-7	1	<1	76	32	45
	E-8	1	<1	3		<1
	E-9	1	<1		5	
Total Suspended Solids	E-6	3	29	220	33	250
	E-7	3	29	13	16	74
	E-8	1	29	7.4		7.3
	E-9	3	29		2.3	
pH (standard units)	E-6	3	6.71	6.12	6.56	6.91
	E-7	3	6.71	6.01	6.24	6.10
	E-8	1	6.71	2.71		2.74
	E-9	3	6.71		8.50	

1. The following toxic pollutants were not detected at this plant: 1-4, 6-10, 14-21, 24-26, 29-33, 35, 38, 40-42, 45-54, 56-60, 64, 68, 69, 74, 77, 79, 80, 82, 85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

**Present, but not quantifiable.

Table V-272

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT F

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	F-31	1	0.014	ND	ND	ND
	F-32	1	0.014		ND	ND
	F-33	1	0.014		ND	0.011
	F-34	1	0.014		0.012	ND
23. chloroform	F-31	1	ND	ND	ND	ND
	F-32	1	ND		ND	ND
	F-33	1	ND		ND	ND
	F-34	1	ND		0.006	ND
44. methylene chloride	F-31	1	0.002	1.170	4.940	0.494
	F-32	1	0.002		1.150	0.095
	F-33	1	0.002		0.040	0.002
	F-34	1	0.002		0.005	ND
55. naphthalene	F-31	1	0.001	ND	0.398	0.744
	F-32	1	0.001		ND	0.353
	F-33	4	0.001		0.001	ND
	F-34	4	0.001		0.001	ND
58. 4-nitrophenol	F-31	1	ND	ND	0.250	ND
	F-32	1	ND		ND	ND
	F-33	4	ND		ND	ND
	F-34	4	ND		ND	ND
64. pentachlorophenol	F-31	1	ND	0.818	0.981	1.080
	F-32	1	ND		ND	ND
	F-33	4	ND		ND	ND
	F-34	4	ND		ND	ND
66. bis(2-ethylhexyl) phthalate	F-31	1	ND	ND	ND	ND
	F-32	1	ND		ND	ND
	F-33	4	ND		0.004	0.004
	F-34	4	ND		ND	ND
68. di-n-butyl phthalate	F-31	1	ND	ND	ND	ND
	F-32	1	ND		0.105	ND
	F-33	4	ND		0.001	ND
	F-34	4	ND		ND	ND
81. phenanthrene	F-31	1	ND	0.364	0.896	0.947
	F-32	1	ND		ND	ND
	F-33	4	ND		ND	ND
	F-34	4	ND		ND	ND

Table V-272 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT F

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
86. toluene	F-31	1	ND	ND	ND	ND
	F-32	1	ND		ND	ND
	F-33	1	ND		0.047	ND
	F-34	1	ND		ND	ND
114. antimony	F-31	1	<0.002	0.015	0.015	<0.002
	F-32	1	<0.002		0.015	<0.002
	F-33	4	<0.002	<0.002	0.003	<0.002
	F-34	4	<0.002	0.005	0.004	<0.002
115. arsenic	F-31	1	<0.005	0.025	0.016	<0.005
	F-32	1	<0.005		<0.005	0.005
	F-33	4	<0.005	<0.005	0.021	0.009
	F-34	4	<0.005	<0.005	0.020	0.010
117. beryllium	F-31	1	<0.010	<0.010	<0.010	<0.010
	F-32	1	<0.010		<0.010	<0.010
	F-33	4	<0.010	<0.010	<0.010	<0.010
	F-34	4	<0.010	<0.010	<0.010	<0.010
118. cadmium	F-31	1	<0.050	<0.050	<0.050	<0.050
	F-32	1	<0.050		<0.050	<0.050
	F-33	4	<0.050	<0.050	<0.050	<0.050
	F-34	4	<0.050	<0.050	<0.050	<0.050
119. chromium (total)	F-31	1	<0.100	<0.100	4.15	0.940
	F-32	1	<0.100		0.870	0.980
	F-33	4	<0.100	3.16	3.82	7.78
	F-34	4	<0.100	0.170	0.110	0.100
120. copper	F-34	1	0.170	4.10	5.17	1.10
	F-34	1	0.170		0.590	0.280
	F-34	4	0.170	21.2	26.5	52.0
	F-34	4	0.170	0.630	0.450	0.360
121. cyanide (total)	F-31	1	<0.02	<0.02	<0.02	<0.02
	F-32	1	<0.02		<0.02	<0.02
	F-33	1	<0.02	<0.02	<0.02	<0.02
	F-34	1	<0.02	<0.02	<0.02	<0.02
122. lead	F-31	1	<0.100	2.40	2.69	0.530
	F-32	1	<0.100		1.73	1.46
	F-33	4	<0.100	<0.100	0.110	0.190
	F-34	4	<0.100	<0.100	<0.100	<0.100

Table V-272 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT F

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	F-31	1	<0.0020	<0.0020	<0.0020	<0.0020
	F-32	1	<0.0020		<0.0020	<0.0020
	F-33	4	<0.0020	<0.0020	<0.0020	<0.0020
	F-34	4	<0.0020	<0.0020	<0.0020	<0.0020
124. nickel	F-31	1	0.200	23.6	39.0	7.10
	F-32	1	0.200		18.4	25.8
	F-33	4	0.200	113	190	9.50
	F-34	4	0.200	3.79	2.72	3.93
125. selenium	F-31	1	<0.010	<0.010	<0.010	<0.010
	F-32	1	<0.010		<0.010	<0.010
	F-33	4	<0.010	0.011	<0.010	0.021
	F-34	4	<0.010	0.019	<0.010	0.032
126. silver	F-31	1	<0.002	0.003	0.006	<0.002
	F-32	1	<0.002		<0.002	<0.002
	F-33	4	<0.002	<0.002	0.002	0.002
	F-34	4	<0.002	<0.002	<0.002	<0.002

Table V-272 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT F

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
127. thallium	F-31	1	<0.005	<0.005	<0.005	<0.005
	F-32	1	<0.005		<0.005	<0.005
	F-33	4	<0.005	<0.005	<0.005	<0.005
	F-34	4	<0.005	0.005	<0.005	<0.005
128. zinc	F-31	1	<0.050	8.50	17.4	3.40
	F-32	1	<0.050		6.20	10.2
	F-33	4	<0.050	0.700	1.13	1.41
	F-34	4	<0.050	0.060	0.050	0.050
Nonconventional Pollutants						
Acidity	F-31	1	<1	<1	<1	<1
	F-32	1	<1		110	110
	F-33	4	<1	<1	<1	<1
	F-34	4	<1	<1	<1	<1
Alkalinity	F-31	1	61	61	35	22
	F-32	1	61		<1	<1
	F-33	4	61	<1	130	390
	F-34	4	61	470	790	1240
Aluminum	F-31	1	0.910	2.30	5.20	0.950
	F-32	1	0.910		1.48	0.380
	F-33	4	0.910	<0.020	0.020	0.020
	F-34	4	0.910	0.100	0.200	0.380
Ammonia Nitrogen	F-31	1	0.04	7.6	<0.01	5.5
	F-32	1	0.04		1.4	5.8
	F-33	4	0.04	2.2	6.1	2.7
	F-34	4	0.04	1.5	11	5.2
Barium	F-31	1	0.080	0.110	0.220	0.210
	F-32	1	0.080		0.080	0.110
	F-33	4	0.080	0.050	0.050	0.080
	F-34	4	0.080	0.020	0.030	0.060
Boron	F-31	1	<0.100	0.320	0.440	0.110
	F-32	1	<0.100		0.310	0.360
	F-33	4	<0.100	<0.100	<0.100	0.760
	F-34	4	<0.100	0.190	0.350	0.720

Table V-272 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT F

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Calcium	F-31	1	46.2	30.1	34.7	9.30
	F-32	1	46.2		34.7	44.5
	F-33	4	46.2	34.9	25.0	31.4
	F-34	4	46.2	22.2	21.9	36.8
Chemical Oxygen Demand (COD)	F-31	1	<1	46,000	18,000	23,000
	F-32	1	<1		7,900	4,900
	F-33	4	<1	8	55	93
	F-34	4	<1	<1	43	8
Chloride	F-31	1	12	30	61	34
	F-32	1	12		20	22
	F-33	4	12	130	180	330
	F-34	4	12	120	170	310
Cobalt	F-31	1	<0.100	0.130	0.310	<0.100
	F-32	1	<0.100		0.120	0.140
	F-33	4	<0.100	<0.100	<0.100	<0.100
	F-34	4	<0.100	<0.100	<0.100	<0.100
Fluoride	F-31	1	0.43	37	13	16
	F-32	1	0.43		19	12
	F-33	4	0.43	31	40	108
	F-34	4	0.43	24	27	160
Iron	F-31	1	1.37	58.4	80.0	16.6
	F-32	1	1.37		49.0	48.1
	F-33	4	1.37	25.2	50.0	85.1
	F-34	4	1.37	1.33	0.790	0.180
Magnesium	F-31	1	12.7	6.44	9.29	1.46
	F-32	1	12.7		6.80	7.63
	F-33	4	12.7	10.5	8.03	9.03
	F-34	4	12.7	7.02	7.83	13.8
Manganese	F-31	1	0.080	0.980	1.40	0.260
	F-32	1	0.080		0.860	1.02
	F-33	4	0.080	3.88	5.34	5.20
	F-34	4	0.080	0.120	0.070	0.230
Molybdenum	F-31	1	<0.200	0.420	0.830	<0.200
	F-32	1	<0.200		<0.200	<0.200
	F-33	4	<0.200	0.440	0.610	1.99
	F-34	4	<0.200	<0.200	<0.200	1.51

Table V-272 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT F

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phenolics	F-31	1	<0.005	0.49	1.2	0.15
	F-32	1	<0.005		0.12	0.12
	F-33	1	<0.005	<0.005	<0.005	<0.005
	F-34	1	<0.005	<0.005	<0.005	<0.005
Phosphate	F-31	1	<4	53	23	39
	F-32	1	<4		40	34
	F-33	4	<4	<4	<4	<4
	F-34	4	<4	<4	<4	<4
Sodium	F-31	1	154	31.2	14.2	5.50
	F-32	1	154		26.4	27.8
	F-33	4	154	640	820	1,580
	F-34	4	154	1,010	1,200	4,200
Sulfate	F-31	1	130	330	230	370
	F-32	1	130		930	750
	F-33	4	130	640	850	1,400
	F-34	4	130	610	940	1,400
Tin	F-31	1	<0.200	<0.200	<0.200	<0.200
	F-32	1	<0.200		<0.200	<0.200
	F-33	4	<0.200	<0.200	<0.200	<0.200
	F-34	4	<0.200	<0.200	<0.200	<0.200
Titanium	F-31	1	<0.020	0.100	0.200	0.040
	F-32	1	<0.020		0.020	<0.020
	F-33	4	<0.020	0.310	0.440	0.960
	F-34	4	<0.020	0.020	<0.020	<0.020
Total Dissolved Solids (TDS)	F-31	1	320	5,070	130,000	3,040
	F-32	1	320		8,110	1,700
	F-33	4	320	2,500	3,400	6,100
	F-34	4	320	3,000	3,900	6,800
Total Organic Carbon (TOC)	F-31	1	2	4,600	3,800	3,600
	F-32	1	2		1,600	25
	F-33	4	2	8	4	11
	F-34	4	2	4	4	5
Total Solids (TS)	F-31	1	330	41,800	340,000	70,000
	F-32	1	330		8,200	4,000
	F-33	4	330	2,700	3,900	6,600
	F-34	4	330	3,140	3,900	6,800

Table V-272 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT F

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	F-31	1	<0.010	0.030	<0.010	<0.010
	F-32	1	<0.010		<0.010	<0.010
	F-33	4	<0.010	<0.010	<0.010	<0.010
	F-34	4	<0.010	<0.010	0.010	<0.010
Yttrium	F-31	1	<0.020	<0.020	<0.020	<0.020
	F-32	1	<0.020		<0.020	<0.020
	F-33	4	<0.020	<0.020	<0.020	<0.020
	F-34	4	<0.020	<0.020	<0.020	<0.020
Conventional Pollutants						
Oil and Grease	F-31	1	<1	4,700	12,000	59,000
	F-32	1	<1		310	380
	F-33	1	<1	17	18	10
	F-34	1	<1	4	<1	<1
Total Suspended Solids (TSS)	F-31	1	22	8,400	2,400	16,500
	F-32	1	22		144	260
	F-33	4	22	100	240	700
	F-34	4	22	30	27	58
pH (standard units)	F-31	1	6.64	5.14	4.88	4.78
	F-32	1	6.64		2.36	2.38
	F-33	4	6.64	4.29	7.13	7.27
	F-34	4	6.64	8.89	9.41	9.20

1. The following toxic pollutants were not detected at this plant: 1-10, 12-22, 24-43, 45-54, 56, 57, 59-63, 65, 67, 69-80, 82-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-273

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT I

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Toxic Pollutants						
11. 1,1,1-trichloroethane	I-11	1	0.022		0.058	0.057
	I-12	1	0.022		0.007	0.010
	I-13	1	0.022	0.012	0.024	0.023
14. 1,1,2-trichloroethane	I-11	1	ND		0.004	0.004
	I-12	1	ND		ND	ND
	I-13	1	ND	ND	0.001	ND
29. 1,1-dichloroethylene	I-11	1	ND		ND	0.015
	I-12	1	ND		ND	ND
	I-13	1	ND	ND	ND	0.007
30. 1,2-*trans*-dichloroethylene	I-11	1	ND		0.096	0.139
	I-12	1	ND		ND	ND
	I-13	1	ND	0.022	0.051	0.037
44. methylene chloride	I-11	1	0.003		0.082	0.101
	I-12	1	0.003		0.003	0.005
	I-13	1	0.003	0.028	0.026	0.030
65. phenol	I-11	4	ND		0.011	0.024
	I-12	1,3	ND		ND	ND
	I-13	4	ND	0.004	ND	0.007
66. bis(2-ethylhexyl) phthalate	I-11	4	ND		**	ND
	I-12	1,3	ND		ND	0.002
	I-13	4	ND	ND	ND	ND
85. tetrachloroethylene	I-11	1	ND		0.015	0.020
	I-12	1	ND		ND	ND
	I-13	1	ND	ND	0.005	0.004
86. toluene	I-11	1	ND		ND	ND
	I-12	1	ND		0.001	0.001
	I-13	1	ND	ND	0.001	0.001
87. trichloroethylene	I-11	1	ND		0.972	1.250
	I-12	1	ND		ND	0.018
	I-13	1	ND	0.252	0.346	0.391
114. antimony	I-11	4	<0.010		<0.010	<0.010
	I-12	3	<0.010			<0.010
	I-13	4	<0.010	<0.010	<0.010	<0.010

Table V-273 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT I

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Toxic Pollutants (Continued)						
115. arsenic	I-11	4	<0.010		<0.010	<0.010
	I-12	3	<0.010			0.030
	I-13	4	<0.010	<0.010	<0.010	0.020
117. beryllium	I-11	4	<0.005		<0.005	<0.005
	I-12	3	<0.005			<0.005
	I-13	4	<0.005	<0.005	<0.005	<0.005
118. cadmium	I-11	4	<0.020		0.050	0.020
	I-12	3	<0.020			<0.020
	I-13	4	<0.020	0.120	0.080	0.020
119. chromium (total)	I-11	4	<0.020		<0.020	<0.020
	I-12	3	<0.020			0.040
	I-13	4	<0.020	<0.020	<0.020	<0.020
120. copper	I-11	4	0.200		0.700	0.450
	I-12	3	0.200			1.10
	I-13	4	0.200	1.70	0.750	0.450
121. cyanide (total)	I-11	1	<0.02		<0.02	<0.02
	I-12	1	<0.02		<0.02	<0.02
	I-13	1	<0.02	<0.02	<0.02	<0.02
122. lead	I-11	4	<0.050		0.050	0.050
	I-12	3	<0.050			0.300
	I-13	4	<0.050	0.200	0.150	0.100
123. mercury	I-11	4	<0.0002		<0.0002	<0.0002
	I-12	3	<0.0002			<0.0002
	I-13	4	<0.0002	<0.0002	<0.0002	<0.0002
124. nickel	I-11	4	<0.050		0.050	<0.050
	I-12	3	<0.050			0.100
	I-13	4	<0.050	0.200	0.050	<0.050
125. selenium	I-11	4	<0.010		<0.010	<0.010
	I-12	3	<0.010			<0.010
	I-13	4	<0.010	<0.010	<0.010	<0.010

Table V-273 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT I

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Toxic Pollutants (Continued)						
126. silver	I-11	4	<0.010		0.020	0.060
	I-12	3	<0.010			0.030
	I-13	4	<0.010	0.110	<0.010	0.030
127. thallium	I-11	4	<0.010		<0.010	<0.010
	I-12	3	<0.010			<0.010
	I-13	4	<0.010	<0.010	<0.010	<0.010
128. zinc	I-11	4	0.040		0.140	0.320
	I-12	3	0.040			0.620
	I-13	4	0.040	1.42	0.340	0.320
Nonconventional Pollutants						
Acidity	I-11	4	<1		<1	<1
	I-12	3	<1			140
	I-13	4	<1	<1	<1	<1
Alkalinity	I-11	4	40		44	39
	I-12	3	40			<1
	I-13	4	40	32	59	70
Aluminum	I-11	4	<0.100		<0.100	<0.100
	I-12	3	<0.100			0.100
	I-13	4	<0.100	0.400	0.200	0.200

Table V-273 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT I

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)						
Ammonia Nitrogen	I-11	4	0.06		0.06	0.37
	I-12	3	0.06			0.07
	I-13	4	0.06	1.1	0.05	<0.01
Barium	I-11	4	<0.050		<0.050	<0.050
	I-12	3	<0.050			<0.050
	I-13	4	<0.050	<0.050	<0.050	<0.050
Boron	I-11	4	<0.100		1.50	0.400
	I-12	3	<0.100			0.500
	I-13	4	<0.100	0.170	1.70	0.800
Calcium	I-11	4	13.8		11.8	11.9
	I-12	3	13.8			13.1
	I-13	4	13.8	15.1	12.6	12.4
Chemical Oxygen Demand (COD)	I-11	4	150		1,800	76
	I-12	3	150			72
	I-13	4	150	180	1,500	<10
Chloride	I-11	4	30		26	35
	I-12	3	30			27
	I-13	4	30	<1	27	32
Cobalt	I-11	4	<0.050		<0.050	<0.050
	I-12	3	<0.050			<0.050
	I-13	4	<0.050	<0.050	<0.050	<0.050
Fluoride	I-11	4	0.32		0.08	0.17
	I-12	3	0.32			0.35
	I-13	4	0.32	0.29	0.08	0.22
Iron	I-11	4	0.100		0.500	0.300
	I-12	3	0.100			0.850
	I-13	4	0.100	1.45	0.800	0.500
Magnesium	I-11	4	2.70		2.40	2.40
	I-12	3	2.70			2.50
	I-13	4	2.70	2.90	2.40	2.30
Manganese	I-11	4	0.100		0.050	0.050
	I-12	3	0.100			0.100
	I-13	4	0.100	0.150	0.050	0.050

Table V-273 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT I

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)						
Molybdenum	I-11	4	<0.050		<0.050	<0.050
	I-12	3	<0.050			<0.050
	I-13	4	<0.050	<0.050	<0.050	<0.050
Phenolics	I-11	1	<0.005		0.25	<0.005
	I-12	1	<0.005		<0.005	<0.005
	I-13	1	<0.005	<0.005	<0.005	<0.005
Phosphate	I-11	4	2.7		13	12
	I-12	3	2.7			17
	I-13	4	2.7	30	17	9.8
Sodium	I-11	4	28.0		34.9	33.6
	I-12	3	28.0			29.2
	I-13	4	28.0	68.3	84.8	84.6
Sulfate	I-11	4	740		480	570
	I-12	3	740			580
	I-13	4	740	460	390	760
Tin	I-11	4	<0.050		<0.050	<0.050
	I-12	3	<0.050			<0.050
	I-13	4	<0.050	<0.050	<0.050	<0.050
Titanium	I-11	4	<0.050		<0.050	<0.050
	I-12	3	<0.050			<0.050
	I-13	4	<0.050	<0.050	<0.050	<0.050
tal Dissolved Solids (TDS)	I-11	4	850		850	134
	I-12	3	850			180
	I-13	4	850	300	440	250
Total Organic Carbon (TOC)	I-11	4	63		36	11
	I-12	3	63			4
	I-13	4	63	20	17	5
Total Solids (TS)	I-11	4	11,500		900	150
	I-12	3	11,500			240
	I-13	4	11,500	500	450	290

Table V-273 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT I

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 2	Day 3	Day 4
Nonconventional Pollutants (Continued)						
Vanadium	I-11	4	<0.050		<0.050	<0.050
	I-12	3	<0.050			<0.050
	I-13	4	<0.050	<0.050	<0.050	<0.050
Yttrium	I-11	4	<0.050		<0.050	<0.050
	I-12	3	<0.050			<0.050
	I-13	4	<0.050	<0.050	<0.050	<0.050
Conventional Pollutants						
Oil and Grease	I-11	1	<1		59	<1
	I-12	1	<1		66	<1
	I-13	1	<1	3	49	<1
Total Suspended Solids (TSS)	I-11	4	300		48	16
	I-12	3	300			16
	I-13	4	300	200	<1	4
pH (Standard Units)	I-11	4	6.10		6.10	6.20
	I-12	3	6.10			2.80
	I-13	4	6.10	6.10	6.80	8.40

1. The following toxic pollutants were not detected at this plant: 1-10, 12, 13, 15-28, 31-43, 45-64, 67-84, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

**Present, but not quantifiable.

Table V-274

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT J

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	J-7	1	<0.010		<0.010	
115. arsenic	J-7	1	<0.010		<0.010	
117. beryllium	J-7	1	<0.005		<0.005	
118. cadmium	J-7	1	<0.020		<0.020	
119. chromium (total)	J-7	1	<0.020		<0.020	
120. copper	J-7	1	<0.050		0.950	
121. cyanide (total)	J-7	1	<0.02		<0.02	
122. lead	J-7	1	<0.050		0.200	
123. mercury	J-7	1	<0.0002		<0.0002	
124. nickel	J-7	1	<0.050		<0.050	
125. selenium	J-7	1	<0.010		<0.010	
126. silver	J-7	1	<0.010		<0.010	
127. thallium	J-7	1	<0.010		<0.010	
128. zinc	J-7	1	0.080		0.100	
Nonconventional Pollutants						
Acidity	J-7	1	<1		<1	
Alkalinity	J-7	1	13		44	
Aluminum	J-7	1	0.300		0.300	
Ammonia Nitrogen	J-7	1	0.16		0.40	
Barium	J-7	1	0.050		0.050	
Boron	J-7	1	<0.100		<0.100	
Calcium	J-7	1	10.4		9.30	
Chemical Oxygen Demand (COD)	J-7	1	70		740	

Table V-274 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT J

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chloride	J-7	1	<1		7	
Cobalt	J-7	1	<0.050		<0.050	
Fluoride	J-7	1	1.2		1.1	
Iron	J-7	1	0.100		0.400	
Magnesium	J-7	1	1.40		1.30	
Manganese	J-7	1	0.200		<0.050	
Molybdenum	J-7	1	<0.050		0.050	
Phenolics	J-7	1	<0.005		32	
Phosphate	J-7	1	<0.5		4	
Sodium	J-7	1	111		9.50	
Sulfate	J-7	1	90		1,800	
Tin	J-7	1	<0.050		<0.050	
Titanium	J-7	1	<0.050		<0.050	
Total Dissolved Solids (TDS)	J-7	1	76		260	
Total Organic Carbon (TOC)	J-7	1	3		600	
Total Solids (TS)	J-7	1	125		950	
Vanadium	J-7	1	<0.050		<0.050	
Yttrium	J-7	1	<0.050		<0.050	

Table V-274 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT J

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	J-7	1	<1		200	
Total Suspended Solids (TSS)	J-7	1	42		500	
pH (standard units)	J-7	1	2.71		7.90	

1. No analyses were performed on the following toxic pollutants: 2-4, 6, 7, 10, 11, 13-17, 19, 23, 29, 30, 32, 33, 38, 44-51, 85-113, 116, and 129.

2. The following toxic pollutants were not detected at this plant: 1, 5, 8, 9, 12, 18, 20-22, 24-28, 31, 34-37, 39-43, and 52-84.

Table V-275

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. acrylonitrile	M-14	1	0.011		0.008	
	M-15	1	0.011			0.017
	M-16	1	0.011	0.010	0.008	0.015
	M-17	1	0.011	0.011	0.010	0.013
	M-18	1	0.011	0.016	0.010	0.019
	M-19	1	0.011	0.011	0.009	0.018
14. 1,1,2-trichloroethane	M-14	1	ND		ND	
	M-15	1	ND			ND
	M-16	1	ND	ND	ND	ND
	M-17	1	ND	0.001	ND	ND
	M-18	1	ND	0.001	0.001	ND
	M-19	1	ND	ND	ND	ND
23. chloroform	M-14	1	0.016		0.005	
	M-15	1	0.016			0.005
	M-16	1	0.016	ND	ND	ND
	M-17	1	0.016	ND	ND	ND
	M-18	1	0.016	ND	ND	ND
	M-19	1	0.016	ND	ND	ND
26. 1,3-dichlorobenzene	M-14	1	ND		ND	
	M-15	1	ND			ND
	M-16	3	ND	0.001	ND	ND
	M-17	3	ND	ND	ND	ND
	M-18	1	ND	ND	ND	ND
	M-19	1	ND	ND	ND	ND
44. methylene chloride	M-14	1	0.002		0.002	
	M-15	1	0.002			0.004
	M-16	1	0.002	0.003	0.003	0.002
	M-17	1	0.002	0.003	0.003	0.001
	M-18	1	0.002	0.003	0.003	0.003
	M-19	1	0.002	0.003	0.002	0.005
55. naphthalene	M-14	1	ND		ND	
	M-15	1	ND			ND
	M-16	3	ND	ND	ND	ND
	M-17	3	ND	ND	ND	0.003
	M-18	1	ND	ND	ND	ND
	M-19	1	ND	ND	ND	ND

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
66. bis(2-ethylhexyl) phthalate	M-14	1	ND		ND	
	M-15	1	ND			ND
	M-16	3	ND	ND	0.002	0.005
	M-17	3	ND	ND	ND	0.001
	M-18	1	ND	ND	ND	ND
	M-19	1	ND	ND	ND	ND
86. toluene	M-14	1	ND		ND	
	M-15	1	ND			ND
	M-16	1	ND	ND	ND	ND
	M-17	1	ND	ND	ND	ND
	M-18	1	ND	ND	ND	0.001
	M-19	1	ND	ND	ND	0.003
114. antimony	M-14	1	<0.010		0.010	
	M-15	1	<0.010			<0.010
	M-16	3	<0.010	<0.010	<0.010	<0.010
	M-17	3	<0.010	<0.010	<0.010	<0.010
	M-18	1	<0.010	0.040	0.270	<0.010
	M-19	1	<0.010	<0.100	<0.200	<0.050
115. arsenic	M-14	1	<0.010		<0.010	
	M-15	1	<0.010			<0.010
	M-16	3	<0.010	<0.010	0.050	0.080
	M-17	3	<0.010	<0.010	<0.010	0.020
	M-18	1	<0.010	<0.010	<0.010	<0.010
	M-19	1	<0.010	<0.020	<0.010	<0.020
117. beryllium	M-14	1	<0.005		<0.005	
	M-15	1	<0.005			<0.005
	M-16	3	<0.005	<0.005	<0.010	<0.005
	M-17	3	<0.005	<0.005	<0.005	<0.005
	M-18	1	<0.005	<0.005	<0.200	<0.005
	M-19	1	<0.005	<0.050	<0.050	<0.010
118. cadmium	M-14	1	<0.020		0.060	
	M-15	1	<0.020			0.020
	M-16	3	<0.020	0.300	1.80	2.10
	M-17	3	<0.020	0.080	0.020	0.020
	M-18	1	<0.020	<0.020	<0.040	<0.020
	M-19	1	<0.020	<0.200	<0.200	<0.050

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
119. chromium (total)	M-14	1	<0.020		0.220	
	M-15	1	<0.020			0.220
	M-16	3	<0.020	0.020	0.200	0.240
	M-17	3	<0.020	<0.020	0.020	0.040
	M-18	1	<0.020	0.060	0.240	0.040
	M-19	1	<0.020	<0.200	<0.200	<0.050
120. copper	M-14	1	<0.050		9.25	
	M-15	1	<0.050			<0.050
	M-16	3	<0.050	1.20	25.6	29.0
	M-17	3	<0.050	0.200	0.300	0.400
	M-18	1	<0.050	<0.050	0.300	0.050
	M-19	1	<0.050	<0.500	<0.500	0.100

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
121. cyanide (total)	M-14	1	<0.02		<0.02	
	M-15	1	<0.02			<0.02
	M-16	1	<0.02	<0.02	<0.02	<0.02
	M-17	1	<0.02	<0.02	<0.02	<0.02
	M-18	1	<0.02	<0.02	<0.02	<0.02
	M-19	1	<0.02	<0.02	<0.02	<0.02
122. lead	M-14	1	<0.050		<5.00	
	M-15	1	<0.050			<5.00
	M-16	3	<0.050	<0.100	<1.00	<1.00
	M-17	3	<0.050	<0.050	<0.500	<0.500
	M-18	1	<0.050	<0.500	0.200	<0.500
	M-19	1	<0.050	<0.500	<0.500	<0.100
123. mercury	M-14	1	<0.0002		<0.0002	
	M-15	1	<0.0002			<0.0002
	M-16	3	<0.0002	<0.0002	0.0004	0.0004
	M-17	3	<0.0002	<0.0002	<0.0002	<0.0002
	M-18	1	<0.0002	0.0008	0.0018	0.0002
	M-19	1	<0.0002	0.0032	<0.0002	0.0002
124. nickel	M-14	1	<0.050		3.95	
	M-15	1	<0.050			<0.050
	M-16	3	<0.050	28.4	585	693
	M-17	3	<0.050	2.80	5.10	5.85
	M-18	1	<0.050	0.750	8.20	0.900
	M-19	1	<0.050	<0.500	<0.500	<0.200
125. selenium	M-14	1	<0.010		<0.010	
	M-15	1	<0.010			<0.010
	M-16	3	<0.010	<0.010	<0.010	<0.010
	M-17	3	<0.010	<0.010	<0.010	<0.010
	M-18	1	<0.010	<0.010	<0.010	<0.010
	M-19	1	<0.010	<0.010	<0.040	<0.020
126. silver	M-14	1	<0.010		0.160	
	M-15	1	<0.010			<0.010
	M-16	3	<0.010	0.040	0.080	0.090
	M-17	3	<0.010	0.040	0.060	0.160
	M-18	1	<0.010	<0.010	0.170	<0.010
	M-19	1	<0.010	0.040	0.030	0.030

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
127. thallium	M-14	1	<0.010		<0.010	
	M-15	1	<0.010			<0.010
	M-16	3	<0.010	<0.010	<0.050	<0.050
	M-17	3	<0.010	<0.010	<0.010	<0.100
	M-18	1	<0.010	<0.010	<0.010	<0.010
	M-19	1	<0.010	<0.050	<0.050	<0.050
128. zinc	M-14	1	0.080		<0.050	
	M-15	1	0.080			<0.500
	M-16	3	0.080	0.240	5.16	6.06
	M-17	3	0.080	0.020	0.040	<0.020
	M-18	1	0.080	0.080	0.080	0.060
	M-19	1	0.080	<0.200	<0.200	<0.050
Nonconventional Pollutants						
Acidity	M-14	1	<1		<1	
	M-15	1	<1			<1
	M-16	3	<1	<1	<1	<1
	M-17	3	<1	<1	<1	<1
	M-18	1	<1	580	1,200	430
	M-19	1	<1	<1	<1	<1
Alkalinity	M-14	1	100		150	
	M-15	1	100			300
	M-16	3	100	190	1,950	2,050
	M-17	3	100	800	1,330	830
	M-18	1	100	<1	<1	<1
	M-19	1	100	5,740	86	160
Aluminum	M-14	1	0.200		2.20	
	M-15	1	0.200			5.00
	M-16	3	0.200	0.500	7.40	8.20
	M-17	3	0.200	0.100	0.100	0.100
	M-18	1	0.200	1.40	15.4	1.20
	M-19	1	0.200	<1.00	<1.00	<1.00
Ammonia Nitrogen	M-14	1	<0.1		<0.1	
	M-15	1	<0.1			<0.1
	M-16	3	<0.1	0.18	<0.1	2.0
	M-17	3	<0.1	<0.1	<0.1	1.3
	M-18	1	<0.1	<0.1	<0.1	<0.1
	M-19	1	<0.1	0.2	<0.1	0.80

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Barium	M-14	1	<0.050		0.050	
	M-15	1	<0.050			<0.050
	M-16	3	<0.050	<0.050	0.300	0.350
	M-17	3	<0.050	<0.050	<0.050	<0.050
	M-18	1	<0.050	<0.050	0.100	<0.050
	M-19	1	<0.050	<0.500	<0.500	<0.500
Boron	M-14	1	<0.100		5.50	
	M-15	1	<0.100			<0.100
	M-16	3	<0.100	2.10	3.00	4.20
	M-17	3	<0.100	1.60	2.50	2.90
	M-18	1	<0.100	1.60	38.8	1.30
	M-19	1	<0.100	<1.00	<1.00	<1.00
Calcium	M-14	1	36.5		36.9	
	M-15	1	36.5			38.7
	M-16	3	36.5	37.3	236	286
	M-17	3	36.5	26.6	15.3	13.1
	M-18	1	36.5	36.1	34.2	31.5
	M-19	1	36.5	390	425	63.0
Chemical Oxygen Demand (COD)	M-14	1	<5		60	
	M-15	1	<5			150
	M-16	3	<5	62	110	240
	M-17	3	<5	10	58	97
	M-18	1	<5	20	<5	<5
	M-19	1	<5	98	32	40
Chloride	M-14	1	10		13	
	M-15	1	10			<0.1
	M-16	3	10	187	540	620
	M-17	3	10	130	400	490
	M-18	1	10	14	14	14
	M-19	1	10	140	120	93
Cobalt	M-14	1	<0.050		<0.050	
	M-15	1	<0.050			0.050
	M-16	3	<0.050	<0.050	0.100	0.150
	M-17	3	<0.050	<0.050	<0.050	<0.050
	M-18	1	<0.050	<0.050	<1.00	<0.050
	M-19	1	<0.050	<0.500	<0.500	<0.500

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Fluoride	M-14	1	0.85		1.3	
	M-15	1	0.85			1.1
	M-16	3	0.85	4.8	0.83	0.66
	M-17	3	0.85	1.3	0.91	0.96
	M-18	1	0.85	340	2,000	1,980
	M-19	1	0.85	9.6	23	63
Iron	M-14	1	<0.050		3.85	
	M-15	1	<0.050			2.60
	M-16	3	<0.050	6.80	84.5	110
	M-17	3	<0.050	0.650	0.850	1.50
	M-18	1	<0.050	0.700	1.70	0.650
	M-19	1	<0.050	<0.500	<0.500	<0.500
Magnesium	M-14	1	11.3		11.8	
	M-15	1	11.3			10.9
	M-16	3	11.3	12.1	146	173
	M-17	3	11.3	4.00	1.70	1.80
	M-18	1	11.3	12.5	12.4	11.6
	M-19	1	11.3	<1.00	16.0	1.00
Manganese	M-14	1	<0.050		0.100	
	M-15	1	<0.050			0.100
	M-16	3	<0.050	0.200	2.50	3.10
	M-17	3	<0.050	<0.050	<0.050	<0.050
	M-18	1	<0.050	<0.050	<0.100	<0.050
	M-19	1	<0.050	<0.500	<0.500	<0.500
Molybdenum	M-14	1	<0.050		7.15	
	M-15	1	<0.050			<0.500
	M-16	3	<0.050	0.200	1.10	1.00
	M-17	3	<0.050	0.200	0.400	0.650
	M-18	1	<0.050	0.050	0.600	0.050
	M-19	1	<0.050	<0.500	<0.500	<0.500
Phenolics	M-14	1	<0.005		0.007	
	M-15	1	<0.005			<0.005
	M-16	1	<0.005	<0.005	<0.005	<0.005
	M-17	1	<0.005	<0.005	0.005	<0.005
	M-18	1	<0.005	<0.005	<0.005	<0.005
	M-19	1	<0.005	<0.005	<0.005	<0.005

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Phosphate	M-14	1	<4		31	
	M-15	1	<4			44
	M-16	3	<4	24	20	<4
	M-17	3	<4	17	<4	21
	M-18	1	<4	17	120	27
	M-19	1	<4	17	17	12
Sodium	M-14	1	5.20		49.4	
	M-15	1	5.20			124
	M-16	3	5.20	178	534	543
	M-17	3	5.20	441	818	680
	M-18	1	5.20	61.1	96.8	213
	M-19	1	5.20	5,570	5,040	3,540
Sulfate	M-14	1	43		68	
	M-15	1	43			120
	M-16	3	43	100	110	150
	M-17	3	43	75	110	140
	M-18	1	43	230	290	110
	M-19	1	43	8,700	15,000	9,000
Tin	M-14	1	<0.050		<0.500	
	M-15	1	<0.050			<0.500
	M-16	3	<0.050	<0.050	1.20	1.45
	M-17	3	<0.050	<0.050	<0.500	<0.500
	M-18	1	<0.050	<0.200	<0.500	<0.500
	M-19	1	<0.050	<5.00	<5.00	<5.00
Titanium	M-14	1	<0.050		0.150	
	M-15	1	<0.050			0.800
	M-16	3	<0.050	<0.050	0.500	0.550
	M-17	3	<0.050	<0.050	<0.050	<0.050
	M-18	1	<0.050	<0.050	<0.100	<0.050
	M-19	1	<0.050	<0.500	<0.500	<0.500
Total Dissolved Solids (TDS)	M-14	1	270		520	
	M-15	1	270			670
	M-16	3	270	600	1,500	1,500
	M-17	3	270	1,200	2,400	1,800
	M-18	1	270	490	1,200	1,100
	M-19	1	270	17,000	18,000	12,000

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Total Organic Carbon (TOC)	M-14	1	<1		27	
	M-15	1	<1			27
	M-16	3	<1	20	42	50
	M-17	3	<1	15	26	22
	M-18	1	<1	10	24	8
	M-19	1	<1	25	29	7
Total Solids (TS)	M-14	1	280		1,100	
	M-15	1	280			1,400
	M-16	3	280	870	5,300	5,800
	M-17	3	280	1,300	2,500	2,100
	M-18	1	280	550	1,200	1,100
	M-19	1	280	18,000	19,000	12,000
Vanadium	M-14	1	<0.050		0.100	
	M-15	1	<0.050			<0.050
	M-16	3	<0.050	<0.050	0.100	0.050
	M-17	3	<0.050	<0.050	<0.050	<0.050
	M-18	1	<0.050	<0.050	<0.100	<0.050
	M-19	1	<0.050	<0.500	<0.500	<0.500
Yttrium	M-14	1	<0.050		<0.050	
	M-15	1	<0.050			<0.050
	M-16	3	<0.050	<0.050	<0.100	<0.050
	M-17	3	<0.050	<0.050	<0.050	<0.050
	M-18	1	<0.050	<0.050	<0.100	<0.050
	M-19	1	<0.050	<0.500	<0.500	<0.500
Conventional Pollutants						
Oil and Grease	M-14	1	3		<1	
	M-15	1	3			<1
	M-16	1	3	7.8	170	47
	M-17	1	3	<1	2.9	3.7
	M-18	1	3	<1	<1	<1
	M-19	1	3	2	<1	<1
Total Suspended Solids (TSS)	M-14	1	14		600	
	M-15	1	14			520
	M-16	3	14	240	4,100	4,500
	M-17	3	14	150	65	90
	M-18	1	14	110	46	23
	M-19	1	14	250	300	77

Table V-275 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT M

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)						
pH (Standard Units)	M-14	1	7.30		6.50	
	M-15	1	7.30			7.10
	M-16	3	7.30	7.90	10.30	10.10
	M-17	3	7.30	11.50	11.70	11.70
	M-18	1	7.30	1.90	1.60	2.80
	M-19	1	7.30	11.60	9.90	11.40

1. The following toxic pollutants were not detected at this plant: 1-10, 12, 13, 15-22, 24, 25, 27-43, 45-54, 56-65, 67-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-276

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	Q-11	1	0.018	ND		0.008
	Q-14	1	0.018	0.008	**	**
	Q-15	1	0.018	0.012	0.007	0.006
	Q-16	1	0.018	0.009		0.007
	Q-17	1	0.018	ND		0.009
22. p-chloro-m-cresol	Q-11	3	0.011	ND		ND
	Q-14	4	0.011	ND	ND	ND
	Q-15	4	0.011	ND	ND	ND
	Q-16	4	0.011	ND		ND
	Q-17	1	0.011	ND		ND
30. 1,2-trans-dichloroethylene	Q-11	1	ND	ND		ND
	Q-14	1	ND	ND	ND	ND
	Q-15	1	ND	ND	ND	ND
	Q-16	1	ND	0.023		0.014
	Q-17	1	ND	ND		ND
44. methylene chloride	Q-11	1	0.002	0.004		0.013
	Q-14	1	0.002	0.016	0.014	0.019
	Q-15	1	0.002	0.004	0.005	0.122
	Q-16	1	0.002	0.004		0.007
	Q-17	1	0.002	0.004		0.004
65. phenol	Q-11	3	ND	0.001		ND
	Q-14	4	ND	ND	ND	ND
	Q-15	4	ND	0.016	0.006	0.009
	Q-16	4	ND	0.003		0.005
	Q-17	1	ND	ND		ND
66. bis(2-ethylhexyl) phthalate	Q-11	3	ND	ND		ND
	Q-14	4	ND	ND	0.003	ND
	Q-15	4	ND	ND	ND	0.002
	Q-16	4	ND	ND		ND
	Q-17	1	ND	ND		ND
85. tetrachloroethylene	Q-11	1	ND	ND		ND
	Q-14	1	ND	ND	3.660	5.770
	Q-15	1	ND	0.399	0.555	0.460
	Q-16	1	ND	0.031		0.131
	Q-17	1	ND	ND		ND

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
87. trichloroethylene	Q-11	1	ND	ND		ND
	Q-14	1	ND	ND	ND	ND
	Q-15	1	ND	ND	ND	ND
	Q-16	1	ND	0.001		ND
	Q-17	1	ND	ND		ND
88. vinyl chloride (chloroethylene)	Q-11	1	ND	ND		ND
	Q-14	1	ND	ND	ND	ND
	Q-15	1	ND	ND	ND	ND
	Q-16	1	ND	0.002		ND
	Q-17	1	ND	ND		ND

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
114. antimony	Q-11	3	<0.010	<0.010		<0.010
	Q-14	4	<0.010	<0.010	<0.010	<0.010
	Q-15	4	<0.010	<0.200	<0.200	<0.100
	Q-16	4	<0.010	<0.010		<0.050
	Q-17	1	<0.010	<0.010		<0.010
115. arsenic	Q-11	3	<0.010	<0.010		<0.010
	Q-14	4	<0.010	<0.010	<0.010	<0.010
	Q-15	4	<0.010	<0.050		<0.080
	Q-16	4	<0.010	<0.010		<0.010
	Q-17	1	<0.010	<0.010		<0.010
117. beryllium	Q-11	3	<0.005	<0.005		<0.005
	Q-14	4	<0.005	<0.050	<0.050	<0.050
	Q-15	4	<0.005	<0.005	<0.005	<0.005
	Q-16	4	<0.005	<0.005		<0.005
	Q-17	1	<0.005	<0.005		<0.005
118. cadmium	Q-11	3	<0.020	<0.020		<0.020
	Q-14	4	<0.020	<0.200	<0.200	<0.200
	Q-15	4	<0.020	<0.020	<0.020	<0.020
	Q-16	4	<0.020	<0.020		<0.020
	Q-17	1	<0.020	<0.020		<0.020
119. chromium (total)	Q-11	3	<0.020	0.020		0.020
	Q-12	3	<0.020	1,800		
	Q-13	3	<0.020	1,900		
	Q-14	4	<0.020	1,720	1,590	1,430
	Q-15	4	<0.020	0.080	0.100	0.060
	Q-16	4	<0.020	0.040		0.020
	Q-17	1	<0.020	0.020		0.040
119. chromium (hexavalent)	Q-12	3	<0.020	1,700		
	Q-13	3	<0.020	0.60		
120. copper	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	0.500	1.00	1.00
	Q-15	4	<0.050	<0.050	<0.050	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
121. cyanide (total)	Q-11	1	<0.02			<0.02
	Q-14	1	<0.02	<0.02	<0.02	<0.02
	Q-15	1	<0.02	<0.02	<0.02	<0.02
	Q-16	1	<0.02	<0.02		<0.02
	Q-17	1	<0.02	<0.02		<0.02
122. lead	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<5.000	<5.000	<5.000
	Q-15	4	<0.050	0.150	0.150	0.150
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
123. mercury	Q-11	3	0.0002	<0.0002		<0.0002
	Q-14	4	0.0002	<0.0002	<0.0002	0.0008
	Q-15	4	0.0002	<0.0002	<0.0002	<0.0002
	Q-16	4	0.0002	<0.0002		<0.0002
	Q-17	1	0.0002	<0.0002		<0.0002
124. nickel	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<0.500	<0.500	<0.500
	Q-15	4	<0.050	<0.050	<0.050	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
125. selenium	Q-11	3	<0.010	<0.010		<0.010
	Q-14	4	<0.010	<0.010	<0.010	<0.010
	Q-15	4	<0.010	<0.010	<0.010	<0.010
	Q-16	4	<0.010	<0.010		<0.010
	Q-17	1	<0.010	<0.010		<0.010
126. silver	Q-11	3	<0.010	<0.010		<0.010
	Q-14	4	<0.010	<0.010	<0.010	<0.010
	Q-15	4	<0.010	<0.010	<0.010	<0.010
	Q-16	4	<0.010	<0.010		<0.010
	Q-17	1	<0.010	<0.010		<0.010
127. thallium	Q-11	3	<0.010	<0.010		<0.010
	Q-14	4	<0.010	<0.010	<0.010	<0.010
	Q-15	4	<0.010	<0.040	<0.020	<0.010
	Q-16	4	<0.010	<0.010		<0.010
	Q-17	1	<0.010	<0.010		<0.020

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
128. zinc	Q-11	3	0.040	0.320		0.420
	Q-14	4	0.040	13.2	10.4	9.40
	Q-15	4	0.040	0.020	<0.020	<0.020
	Q-16	4	0.040	0.520		0.260
	Q-17	1	0.040	0.120		0.080
Nonconventional Pollutants						
Acidity	Q-11	3	<1	<1		<1
	Q-14	4	<1	130	130	130
	Q-15	4	<1	<1	<1	<1
	Q-16	4	<1	<1		<1
	Q-17	1	<1	<1		<1
Alkalinity	Q-11	3	160	240		330
	Q-14	4	160	<1	<1	<1
	Q-15	4	160	1,300	1,100	1,000
	Q-16	4	160	800		670
	Q-17	1	160	150		150
Aluminum	Q-11	3	<0.100	0.400		0.700
	Q-14	4	<0.100	19.0	23.0	26.0
	Q-15	4	<0.100	0.200	0.200	0.400
	Q-16	4	<0.100	0.400		0.500
	Q-17	1	<0.100	<0.100		<0.100
Ammonia Nitrogen	Q-11	3	0.4	1.2		0.8
	Q-14	4	0.4	8.4	28	29
	Q-15	4	0.4	20	16	17
	Q-16	4	0.4	4.4		5.4
	Q-17	1	0.4	1.3		0.5
Barium	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<0.500	<0.500	<0.500
	Q-15	4	<0.050	0.050	0.100	0.100
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
Boron	Q-11	3	0.300	0.100		0.100
	Q-14	4	0.300	<1.00	1.00	1.00
	Q-15	4	0.300	0.200	0.400	0.500
	Q-16	4	0.300	0.200		0.200
	Q-17	1	0.300	<0.100		0.100

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Calcium	Q-11	3	3.70	5.00		5.00
	Q-14	4	3.70	15.0	14.0	13.0
	Q-15	4	3.70	191	249	199
	Q-16	4	3.70	28.3		47.2
	Q-17	1	3.70	5.00		5.60
Chemical Oxygen Demand (COD)	Q-11	3	500	180		780
	Q-14	4	500	15,000	22,000	23,000
	Q-15	4	500	13,000	15,000	17,000
	Q-16	4	500	3,500		770
	Q-17	1	500	33		<10
Chloride	Q-11	3	7	<1		<1
	Q-14	4	7	<1	<1	<1
	Q-15	4	7	80	76	80
	Q-16	4	7	31		44
	Q-17	1	7	<1		<1
Cobalt	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<0.500	<0.500	<0.500
	Q-15	4	<0.050	<0.050	<0.050	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
Fluoride	Q-11	3	0.3	0.5		1.9
	Q-14	4	0.3	8.9	8.1	9.2
	Q-15	4	0.3	2.6	2.7	3.4
	Q-16	4	0.3	2.7		1.1
	Q-17	1	0.3	1.2		0.29
Iron	Q-11	3	<0.050	0.500		0.100
	Q-14	4	<0.050	30.5	30.5	30.5
	Q-15	4	<0.050	0.250	0.400	0.350
	Q-16	4	<0.050	0.500		0.300
	Q-17	1	<0.050	0.600		0.750
Magnesium	Q-11	3	0.900	16.0		42.4
	Q-14	4	0.900	600	487	437
	Q-15	4	0.900	<0.100	<0.100	<0.100
	Q-16	4	0.900	28.4		27.8
	Q-17	1	0.900	1.00		1.10

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	0.500	0.500	0.500
	Q-15	4	<0.050	<0.050	0.200	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
Molybdenum	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<0.500	<0.500	<0.500
	Q-15	4	<0.050	<0.050	<0.050	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
Phenolics	Q-11	1	<0.005			<0.01
	Q-14	1	<0.005	<0.005	<0.005	<0.01
	Q-15	1	<0.005	<0.005	<0.005	<0.01
	Q-16	1	<0.005	<0.005		<0.01
	Q-17	1	<0.005	<0.005		<0.01
Phosphate	Q-11	3	<0.5	<0.5		<0.5
	Q-14	4	<0.5	28	21	36
	Q-15	4	<0.5	<0.5	<0.5	<0.5
	Q-16	4	<0.5	<0.5		4
	Q-17	1	<0.5	<0.5		<0.732
Sodium	Q-11	3	74.6	79.7		81.7
	Q-14	4	74.6	600	573	521
	Q-15	4	74.6	1,650	3,370	3,540
	Q-16	4	74.6	747		966
	Q-17	1	74.6	60.8		65.6
Sulfate	Q-11	3	480	1,900		1,800
	Q-14	4	480	3,300	3,900	4,500
	Q-15	4	480	9,000	9,000	12,000
	Q-16	4	480	4,800		2,900
	Q-17	1	480	1,200		3,900
Tin	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<0.500	<0.500	<0.500
	Q-15	4	<0.050	<5.00	<5.000	<5.000
	Q-16	4	<0.050	<0.500		<0.500
	Q-17	1	<0.050	<0.050		<0.050

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<0.500	<0.500	<0.500
	Q-15	4	<0.050	<0.050	<0.050	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
Total Dissolved Solids (TDS)	Q-11	3	260	380		580
	Q-14	4	260	8,100	7,400	3,300
	Q-15	4	260	13,000	12,000	12,000
	Q-16	4	260	2,700		3,800
	Q-17	1	260	230		290
Total Organic Carbon (TOC)	Q-11	3	4.2	69		69
	Q-14	4	4.2	2,500	2,200	2,100
	Q-15	4	4.2	1,300	1,200	1,300
	Q-16	4	4.2	310		350
	Q-17	1	4.2	<1		<1
Total Solids (TS)	Q-11	3	200	330		760
	Q-14	4	200	9,000	8,000	7,500
	Q-15	4	200	13,000	12,000	12,000
	Q-16	4	200	2,800		4,000
	Q-17	1	200	140		210,000
Vanadium	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<5.00	<5.00	<5.00
	Q-15	4	<0.050	<0.050	<0.050	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
Yttrium	Q-11	3	<0.050	<0.050		<0.050
	Q-14	4	<0.050	<0.500	<0.500	<0.500
	Q-15	4	<0.050	<0.050	<0.050	<0.050
	Q-16	4	<0.050	<0.050		<0.050
	Q-17	1	<0.050	<0.050		<0.050
Conventional Pollutants						
Oil and Grease	Q-11	1	<1			5
	Q-14	1	<1	<1	6	14
	Q-15	1	<1	<1	5	12
	Q-16	1	<1	<1		9
	Q-17	1	<1	<1		4

Table V-276 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Q

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)						
Total Suspended Solids (TSS)	Q-11	3	31	50		12
	Q-14	4	31	92	70	32
	Q-15	4	31	150	36	2
	Q-16	4	31	77		38
	Q-17	1	31	45		3
pH (Standard Units)	Q-11	3	7.90	6.80		7.30
	Q-14	4	7.90	4.40	4.40	4.40
	Q-15	4	7.90	5.50	5.30	5.30
	Q-16	4	7.90	7.80		7.30
	Q-17	1	7.90	7.40		7.80

1. The following toxic pollutants were not detected at this plant: 1-10, 12-21, 23-29, 31-43, 45-64, 67-84, and 86.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

**Present but not quantifiable.

Table V-277

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT R

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
119. chromium (total)	R-1	7	<0.01	0.890		0.740
	R-2	6	<0.01	0.340		0.300
	R-3	6	<0.01	<0.01		<0.01
	R-4	6	<0.01	<0.01		<0.01
124. nickel	R-1	7	0.022	35.0		25.0
	R-2	6	0.022	0.240		0.440
	R-3	6	0.022	<0.02		0.022
	R-4	6	0.022	0.096		0.10
Nonconventional Pollutants						
Acidity	R-1	7	0	20		27
	R-2	6	0	0		0
	R-3	6	0	0		0
	R-4	6	0	-		-
Fluoride	R-1	7	0.19	0.23		0.17
	R-2	6	0.19	0.22		0.19
	R-3	6	0.19	0.18		0.18
	R-4	6	0.19	0.26		0.29
Iron	R-1	7	1.6	7.6		6.8
	R-2	6	1.6	0.21		0.28
	R-3	6	1.6	<0.1		<0.1
	R-4	6	1.6	0.38		0.36
Conventional Pollutants						
Oil and Grease	R-1	1	<5.0	<5.0		<5.0
	R-2	1	<5.0	<5.0		<5.0
	R-3	1	<5.0	<5.0		<5.0
	R-4	1	<5.0	<5.0		

Table V-277 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT R

Pollutant		Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants (Continued)							
Total Suspended Solids (TSS)	R-1	7	14	56		25	
	R-2	6	14	6.0		7.2	
	R-3	6	14	6.0		1.0	
	R-4	6	14	9.0A		7.5	
pH (standard units)	R-1	1	-	4.8		6.0	
	R-2	1	-	9.8		9.3	
	R-3	1	-	6.8			
	R-4	1	-	7.4			

A - Average Value.

1. No analyses were performed on the following toxic pollutants: 1-118, 120-123, and 125-129.

Table V-278

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT S

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
115. arsenic	S-2	2	<0.01	<0.01		
	S-4	5	<0.01	<0.01		
118. cadmium	S-2	2	<0.05	<0.05		
	S-4	5	<0.05	<0.05		
119. chromium (total)	S-2	2	<0.05	0.582		
	S-4	5	<0.05	<0.050		
120. copper	S-2	2	<0.05	0.236		
	S-4	5	<0.05	<0.050		
121. cyanide (total)	S-2	2	<0.01	<0.01		
	S-4	5	<0.01	<0.01		
122. lead	S-2	2	<0.1	0.101		
	S-4	5	<0.1	<0.100		
123. mercury	S-2	2	<0.0002	<0.0002		
	S-4	5	<0.0002	<0.0002		
124. nickel	S-2	2	<0.200	2.44		
	S-4	5	<0.200	<0.200		
128. zinc	S-2	2	<0.05	0.155		
	S-4	5	<0.05	0.058		
Nonconventional Pollutants						
Aluminum	S-2	2	<0.2	0.263		
	S-4	5	<0.2	<0.200		
Cobalt	S-2	2	<0.1	<0.100		
	S-4	5	<0.1	<0.100		
Fluoride	S-2	2	<0.1	0.16		
	S-4	5	<0.1	0.18		
Iron	S-2	2	0.122	244		
	S-4	5	0.122	1.17		

Table V-278 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT S

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	S-2	1	<1	1.6		
	S-4	1	<1	<1		
Total Suspended Solids (TSS)	S-2	2	<0.1	347		
	S-4	5	<0.1	5.2		
pH (standard units)	S-2	1	-	8.0-8.2		
	S-4	1	-	7.5-8.7		

Footnote: No analyses were performed on the following toxic pollutants: 1 - 114, 116, 117, 125-127, and 129.

Table V-279

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT T

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
119. chromium (total)	T-2	6	<0.01	0.019	0.023	<0.010
120. copper	T-2	6	0.048	0.300	1.400	1.300
121. cyanide (total)	T-2	1	<0.01	<0.01	<0.01	<0.01
122. lead	T-2	6	<0.005	<0.005	<0.005	<0.005
124. nickel	T-2	6	0.075	0.260	0.510	0.340
Nonconventional Pollutants						
Acidity	T-2	6	**	**	**	**
Aluminum	T-2	6	0.14	0.027	0.220	0.072
Cobalt	T-2	6	<0.01	0.310	0.240	0.220
Fluoride	T-2	6	1.01	-	0.87	0.92
Iron	T-2	6	0.270	0.320	0.210	0.220
Conventional Pollutants						
Oil and Grease	T-2	1	<0.1;0.4	0.2;<0.1	1.4;2.0	
Total Suspended Solids (TSS)	T-2	6	1	4	6	6
pH (standard units)	T-2	6	7.70	8.2	8.2	7.83

**Less than detection limit. Detection limit not known.

1. No analyses were performed on the following toxic pollutants: 1-118, 123, and 125-129.

Table V-280

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT U

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	U-15	1	ND			1.800
	U-18	1	ND	0.008		
23. chloroform	U-15	1	0.089			0.097
	U-18	1	0.089	0.016		
44. methylene chloride	U-15	1	ND			0.082
	U-18	1	ND	ND		
48. dichlorobromomethane	U-15	1	0.006			ND
	U-18	1	0.006	ND		
114. antimony	U-15	3	<0.0006			0.0016
	U-18	6	<0.0006	0.0067	0.216	0.151
115. arsenic	U-15	3	<0.001			<0.001
	U-18	6	<0.001	<0.001	<0.001	<0.001
117. beryllium	U-15	3	<0.01			<0.01
	U-18	6	<0.01	<0.01	<0.01	<0.01
118. cadmium	U-15	3	0.064			0.031
	U-18	6	0.064	0.15	2.9	0.79

Table V-280 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT U

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
119. chromium (total)	U-15	3	0.033			0.026
	U-18	6	0.033	0.031	0.059	0.16
120. copper	U-15	3	0.35			0.29
	U-18	6	0.35	1.1	1.7	5.1
121. cyanide (total)	U-15	1	<0.01			<0.01
	U-18	1	<0.01	<0.01	<0.01	0.034
122. lead	U-15	3	0.19			0.15
	U-18	6	0.19	0.31	0.23	1.3
123. mercury	U-15	3	<0.005			<0.005
	U-18	6	<0.005	<0.005	0.021	0.006
124. nickel	U-15	3	0.022			0.05
	U-18	6	0.022	0.09	1.2	2.4
125. selenium	U-15	3	<0.001			<0.001
	U-18	6	<0.001	<0.001	0.002	0.001

Table V-280 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT U

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
126. silver	U-15	3	<0.0005			0.011
	U-18	6	<0.0005	0.012	0.0025	0.011
127. thallium	U-15	3	<0.001			<0.001
	U-19	6	<0.001	0.002	0.0022	0.0027
128. zinc	U-15	3	<0.01			0.81
	U-18	6	<0.01	1.7	0.38	3.0
Nonconventional Pollutants						
Acidity	U-15	3	20.0			10.0
	U-18	6	20.0	<10.0	<10.0	30.0
Alkalinity	U-15	3	25.0			24.0
	U-18	6	25.0	120.0	380.0	136.0

Table V-280 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT U

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Aluminum	U-15	3	0.22			0.22
	U-18	6	0.22	0.29	0.64	0.75
Ammonia Nitrogen	U-18	6	0.06	0.75	2.5	2.7
Barium	U-15	3	<0.01			<0.01
	U-18	6	<0.01	<0.01	0.016	<0.01
Boron	U-15	3	0.033			<0.02
	U-18	6	0.033	0.08	0.47	0.19
Calcium	U-15	3	12.0			12.0
	U-18	6	12.0	88.0	74.0	88.0
Chemical Oxygen Demand	U-18	6	100.0	100.0	<50.0	50.0
Chloride	U-15	3	6.0			17.0
	U-18	6	6.0	67.0	110.0	200.0
Cobalt	U-15	3	<0.01			<0.01
	U-18	6	<0.01	0.02	<0.01	<0.01

Table V-280 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT U

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Fluoride	U-15	3	1.4			1.3
	U-18	6	1.4	3.1	7.6	25.0
Gold	U-15	3	<0.25			<0.25
	U-18	6	<0.25	<0.25	<0.25	<0.25
Iron	U-15	3	0.23			0.25
	U-18	6	0.23	1.2	1.7	2.3
Magnesium	U-15	3	2.1			2.1
	U-18	6	2.1	1.9	2.0	2.9
Manganese	U-15	3	<0.02			0.17
	U-18	6	<0.02	0.46	0.12	0.32
Molybdenum	U-15	3	<0.03			<0.03
	U-18	6	<0.03	<0.03	<0.03	<0.03
Phosphorus	U-18	6	0.78	3.5	3.8	6.5

Table V-280 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT U

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Sodium	U-15	3	7.2			8.5
	U-18	6	7.2	400.0	1,100.0	730.0
Sulfate	U-15	3	3.3			7.5
	U-18	6	3.3	120.0	200.0	150.0
Tin	U-15	3	<0.25			<0.25
	U-18	6	<0.25	<0.25	<0.25	<0.25
Titanium	U-15	3	<0.25			<0.25
	U-18	6	<0.25	<0.25	<0.25	<0.25
Total Dissolved Solids (TDS)	U-15	3	150.0			140.0
	U-18	6	150.0	2,400.0	8,600.0	2,900.0
Total Organic Carbon (TOC)	U-18	6	132.0	27.0	9.0	25.0
Total Solids (TS)	U-15	3	150.0			150.0
	U-18	6	150.0	2,400.0	9,100.0	3,000.0

Table V-280 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT U

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	U-15	3	<0.02			<0.02
	U-18	6	<0.02	<0.02	<0.02	<0.02
Yttrium	U-15	3	<0.12			<0.12
	U-18	6	<0.12	<0.12	<0.12	<0.12
Conventional Pollutants						
Oil and Grease	U-15	1	24.0			160.0
	U-18	1	24.0	300.0	63.0	<1.0
Total Suspended Solids (TSS)	U-15	3	<1.0			2.0
	U-18	6	<1.0	14.0	53.0	20.0
pH (standard units)	U-15	3	5			4
	U-18	6	5	5	5	5

1. The following toxic pollutants were not detected at this plant: 1-10, 12-22, 24-43, 45-47, and 49-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-281

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Concentrations (mg/l) Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
Toxic Pollutants								
22. p-chloro-m-cresol	V-10	1	ND	0.227			1.047	
	V-11	1	ND	ND			0.187	
	V-12	1	ND			189.655		
	V-13	1	ND			26.395		
23. chloroform	V-10	1	0.103	0.098			0.035	
	V-11	1	0.103	0.044			0.011	
	V-12	1	0.103			ND		
	V-13	1	0.103			ND		
66. bis(2-ethylhexyl) phthalate	V-10	1	ND	ND			0.055	
	V-11	1	ND	ND			ND	
	V-12	1	ND			4.416		
	V-13	1	ND			ND		
68. di-n-butyl phthalate	V-10	1	ND	ND			0.019	
	V-11	1	ND	0.015			ND	
	V-12	1	ND			ND		
	V-13	1	ND			ND		
85. tetrachloro-ethylene	V-10	1	ND	0.059			0.310	
	V-11	1	ND	ND			0.047	
	V-12	1	ND			<5.000		
	V-13	1	ND			ND		
114. antimony	V-10	1	<0.0006	<0.0006	<0.0006		<0.0006	<0.0006
	V-11	1	<0.0006	<0.0006	<0.0006		<0.0006	<0.0006
	V-12	1	<0.0006			0.0018		
	V-13	1	<0.0006			<0.0006		
115. arsenic	V-10	1	<0.001	<0.001	<0.001		0.0011	<0.001
	V-11	1	<0.001	<0.001	<0.001		<0.001	<0.001
	V-12	1	<0.001			0.0035		
	V-13	1	<0.001			0.0067		
117. beryllium	V-10	1	0.012	0.3	0.2		0.1	0.086
	V-11	1	0.012	0.012	0.015		0.13	0.033
	V-12	1	0.012			0.02		
	V-13	1	0.012			0.035		

Table V-281 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Concentrations (mg/l) Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
Toxic Pollutants (Continued)								
118. cadmium	V-10	1	<0.03	0.18	0.17		0.08	0.05
	V-11	1	<0.03	0.14	<0.03		<0.03	<0.03
	V-12	1	<0.03			<0.03		
	V-13	1	<0.03			<0.03		
119. chromium (total)	V-10	1	0.061	0.4	0.4		0.2	0.21
	V-11	1	0.061	0.08	<0.03		0.044	0.07
	V-12	1	0.061			0.1		
	V-13	1	0.061			0.09		
119a. chromium (hexavalent)	V-10	1	NA	<0.001			<0.001	
	V-11	1	NA	<0.001	<0.001		<0.001	<0.001
120. copper	V-10	1	0.088	4.2	4.4		2.3	1.7
	V-11	1	0.088	0.09	0.039		0.049	<0.03
	V-12	1	0.088			2.1		
	V-13	1	0.088			0.18		
121. cyanide (total)	V-10	1	<0.01	0.21	<0.1		0.13	0.27
	V-11	1	<0.01	0.21	0.21		<0.1	0.38
	V-12	1	<0.01			0.21		
	V-13	1	<0.01			<0.1		
122. lead	V-10	1	0.036	9.2	8.8		5.2	3.8
	V-11	1	0.036	0.2	0.2		0.2	0.16
	V-12	1	0.036			4.8		
	V-13	1	0.036			0.1		
123. mercury	V-10	1	<0.005	<0.005	<0.005		<0.005	<0.005
	V-11	1	<0.005	<0.005	<0.005		<0.005	<0.005
	V-12	1	<0.005			<0.005		
	V-13	1	<0.005			<0.005		
124. nickel	V-10	1	0.055	1.4	1.3		0.7	0.6
	V-11	1	0.055	0.06	0.038		0.047	0.03
	V-12	1	0.055			0.17		
	V-13	1	0.055			0.18		

Table V-281 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
			Concentrations (mg/l)					
Toxic Pollutants (Continued)								
125. selenium	V-10	1	<0.001	<0.001	<0.001		<0.001	<0.001
	V-11	1	<0.001	<0.001	<0.001		<0.001	<0.0012
	V-12	1	<0.001			<0.001		
	V-13	1	<0.001			<0.001		
126. silver	V-10	1	<0.0005	0.0011	0.0019		0.0018	0.001
	V-11	1	<0.0005	<0.0005	0.0005		0.0011	<0.0005
	V-12	1	<0.0005			0.0007		
	V-13	1	<0.0005			0.0008		
127. thallium	V-10	1	<0.001	<0.001	<0.001		<0.001	<0.001
	V-11	1	<0.001	<0.001	<0.001		<0.001	<0.001
	V-12	1	<0.001			<0.001		
	V-13	1	<0.001			<0.0019		
128. zinc	V-10	1	0.101	0.5	0.5		0.5	0.6
	V-11	1	0.101	0.7	0.033		0.057	0.054
	V-12	1	0.101			3.9		
	V-13	1	0.101			0.3		
Nonconventional Pollutants								
Acidity	V-10	1	<10.0	4,700	120		1,890	940
	V-11	1	<10.0	<10	20		<10	<10
	V-12	1	<10.0			<10		
	V-13	1	<10.0			71		
Alkalinity	V-10	1	33.0	33	<1		<1	<1
	V-11	1	33.0	196	62		294	963
	V-12	1	33.0			663		
	V-13	1	33.0			93		
Aluminum	V-10	1	0.131	29.0	34.0		15.0	12.0
	V-11	1	0.131	3.1	3.7		1.1	1.1
	V-12	1	0.131			5.9		
	V-13	1	0.131			18.0		

Table V-281 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Concentrations (mg/l) Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
Nonconventional Pollutants (Continued)								
Ammonia Nitrogen	V-10	1	0.07	0.92	0.9		<0.02	1.3
	V-11	1	0.07	1.3	1.5		1.6	1.5
	V-12	1	0.07			<0.02		
	V-13	1	0.07			16		
Barium	V-10	1	0.2	2.6	2.3		1.4	0.8
	V-11	1	0.2	0.8	0.13		0.1	0.195
	V-12	1	0.2			0.5		
	V-13	1	0.2			1.0		
Boron	V-10	1	<0.2	1.6	1.4		0.8	0.8
	V-11	1	<0.2	0.4	0.3		0.14	0.102
	V-12	1	<0.2			0.6		
	V-13	1	<0.2			0.6		
Calcium	V-10	1	0.045	268.0	230.0		457.0	492.0
	V-11	1	0.045	1,418.0	1,750		1,336.0	1,350.0
	V-12	1	0.045			68.0		
	V-13	1	0.045			47.0		
Chemical Oxygen Demand (COD)	V-10	1	<50.0	<50	80		<50	15
	V-11	1	<50.0	<50	10			
	V-12	1	<50.0			<50		
	V-13	1	<50.0					
Chloride	V-10	1	36.0	385	210		38	30
	V-11	1	36.0	100	55		60	42
	V-12	1	36.0			230		
	V-13	1	36.0			120		
Cobalt	V-10	1	0.044	2.2	2.1		0.9	0.8
	V-11	1	0.044	0.073	0.049		0.079	0.05
	V-12	1	0.044			0.18		
	V-13	1	0.044			0.15		
Fluoride	V-10	1	0.41	12	7.4		9.4	6.35
	V-11	1	0.41	0.75	5.1		1.9	2.4
	V-12	1	0.41			4.7		
	V-13	1	0.41			4.7		

Table V-281 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Concentrations (mg/l) Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
Nonconventional Pollutants (Continued)								
Iron	V-10	1	0.16	8.1	7.6		7.8	8.7
	V-11	1	0.16	0.23	0.4		0.17	0.15
	V-12	1	0.16			37.0		
	V-13	1	0.16			44.0		
Magnesium	V-10	1	8.0	24.0	5.7		31.0	6.4
	V-11	1	8.0	1.5	0.42		4.8	0.25
	V-12	1	8.0			50.0		
	V-13	1	8.0			2,400.0		
Manganese	V-10	1	0.058	1.3	0.058		1.1	0.7
	V-11	1	0.058	1.0	0.6		0.081	0.042
	V-12	1	0.058			0.8		
	V-13	1	0.058			1.2		
Molybdenum	V-10	1	<0.03	9.2	9.2		4.3	5.1
	V-11	1	<0.03	2.0	4.0		1.6	1.4
	V-12	1	<0.03			2.1		
	V-13	1	<0.03			0.094		
Nitrate	V-10	1	<0.09	6,600			3,300	3,100
	V-11	1	<0.09	5,400	6,200			
	V-12	1	<0.09			46		
Phosphorus	V-10	1	0.5	60	5.8		1.9	16
	V-11	1	0.5	1.2	<0.18		0.88	2.1
	V-12	1	0.5			2.9		
	V-13	1	0.5			2.3		
Sodium	V-10	1	74.0	860.0	220.0		1,030.0	305.0
	V-11	1	74.0	778.0	217.0		1,033.0	1,072.0
	V-12	1	74.0			1,519.0		
	V-13	1	74.0			11.2		
Sulfate	V-10	1	2.8	84	8.8		10	93
	V-11	1	2.8	73	97		97	91
	V-12	1	2.8			12		
	V-13	1	2.8			1,100		

Table V-281 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Concentrations (mg/l) Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
Nonconventional Pollutants (Continued)								
Tin	V-10	1	<0.25	0.3	0.3		<0.25	<0.2
	V-11	1	<0.25	<0.25	<0.2		<0.25	<0.25
	V-12	1	<0.25			<0.25		
	V-13	1	<0.25			<0.25		
Titanium	V-10	1	<0.2	24.0	23.0		15.0	6.8
	V-11	1	<0.2	<0.2	<0.2		0.3	<0.2
	V-12	1	<0.2			0.9		
	V-13	1	<0.2			1.3		
Total Dissolved Solids (TDS)	V-10	1	300.0	11,000	11,000		7,000	5,600
	V-11	1	300.0	6,850	7,600		6,100	6,600
	V-12	1	300.0			7,900		
	V-13	1	300.0			11,000		
Total Organic Carbon (TOC)	V-10	1	<10.0	320	45		39	<1
	V-11	1	<10.0	50	<1		2	<1
	V-12	1	<10.0			1,800		
	V-13	1	<10.0			<1		
Total Solids (TS)	V-10	1	330.0	12,000	12,000		7,100	6,200
	V-11	1	330.0	7,300	7,400		900	6,800
	V-12	1	330.0			1,500		
	V-13	1	330.0			14,000		
Uranium	V-10	1	0.89	2,300	2,100		1,300	6.4
	V-11	1	0.89	3.4	4.6		30	5.1
	V-12	1	0.89			37		
	V-13	1	0.89			0.427		
Vanadium	V-10	1	<0.03	6.0	5.3		2.7	1.8
	V-11	1	<0.03	0.04	<0.03		0.041	0.12
	V-12	1	<0.03			0.245		
	V-13	1	<0.03			0.11		
Yttrium	V-10	1	<0.1	1.7	1.6		1.3	0.8
	V-11	1	<0.1	<0.1	0.1		<0.1	<0.1
	V-12	1	<0.1			0.3		
	V-13	1	<0.1			<0.1		

Table V-281 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Concentrations (mg/l) Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
Nonconventional Pollutants (Continued)								
			Concentrations (nCi/L)					
Gross Alpha	V-10	1	0.014	2,250	2,160		994	96.7
	V-11	1	0.014	3.0	2.8		0.94	1.1
	V-12	1	0.014			25.4		
	V-13	1	0.014			0.23		
Gross Beta	V-10	1	<0.013	3,310	3,079		1,520	154
	V-11	1	<0.013	4.6	4.4		2.6	2.0
	V-12	1	<0.013			38.3		
	V-13	1	<0.013			1.0		
Radium-226	V-10	1	<0.0008	0.0087	0.005		0.0049	0.0060
	V-11	1	<0.0008	<0.0008	0.0014		<0.0011	<0.0013
	V-12	1	<0.0008			0.0045		
	V-13	1	<0.0008			<0.0009		
			Concentrations (mg/l)					
Conventional Pollutants								
Oil and Grease	V-10	1	<1.0	83	60		220	10
	V-11	1	<1.0	7	<1		<1	<1
	V-12	1	<1.0			15,000		
	V-13	1	<1.0			1		

Table V-281 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Steam Code	Sample Type	Concentrations (mg/l) Source	Day 1, Batch 1	Day 1, Batch 2	Day 2	Day 3, Batch 1	Day 3, Batch 2
Conventional Pollutants (Continued)								
Total Suspended Solids (TSS)	V-10	1	<1.0	72	44		420	400
	V-11	1	<1.0	180	6		420	91
	V-12	1	<1.0			470		
	V-13	1	<1.0			2,600		
pH (standard units)	V-10	1	6	1	1		2	9
	V-11	1	6	10	7		11-12	11-12
	V-12	1	6			8-9		
	V-13	1	6			6		

NA - Not analyzed.

1. The following toxic pollutants were not detected at this plant: 1-21, 24-65, 67, 69-84, and 86-88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-282

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT W

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
11. 1,1,1-trichloroethane	W-3	1	ND	ND	0.360	
14. 1,1,2-trichloroethane	W-3	1	ND	0.210	ND	
22. p-chloro-m-cresol	W-3	6	ND	ND	0.048	
23. chloroform	W-3	1	ND	ND	ND	
44. methylene chloride	W-3	1	ND	31.000	9.700	
66. bis(2-ethylhexyl) phthalate	W-3	6	ND	ND	0.016	
69. di-n-octyl phthalate	W-3	6	ND	ND	0.012	
86. toluene	W-3	1	ND	3.400	8.900	
114. antimony	W-3	6	<0.0006	0.0006	0.0006	<0.0006
115. arsenic	W-3	6	<0.001	<0.001	0.002	<0.001
117. beryllium	W-3	6	0.2	0.059	<0.01	<0.01
118. cadmium	W-3	6	<0.03	<0.03	<0.03	<0.03
119. chromium (total)	W-3	6	0.052	<0.04	<0.03	<0.03
120. copper	W-3	6	<0.03	0.032	<0.03	<0.03
121. cyanide (total)	W-3	1	<0.1	0.63	<0.1	

Table V-282 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT W

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
122. lead	W-3	6	0.1	0.13	0.1	0.12
123. mercury	W-3	6	<0.005	<0.005	<0.5	<0.005
124. nickel	W-3	6	0.039	0.11	0.053	0.045
125. selenium	W-3	6	<0.0004	<0.0004	<0.0004	<0.0004
126. silver	W-3	6	<0.005	0.005	<0.005	0.008
127. thallium	W-3	6	<0.001	<0.001	<0.001	<0.001
128. zinc	W-3	6	0.036	0.046	0.048	0.047
Nonconventional Pollutants						
Acidity	W-3	6	10.0	70.0	20.0	10.0
Alkalinity	W-3	6	12.0	25.0	18.0	18.0
Aluminum	W-3	6	0.089	0.9	1.3	1.2
Ammonia Nitrogen	W-3	6	<0.02	1.6	1.1	
Barium	W-3	6	1.6	0.1	0.067	0.061
Boron	W-3	6	0.19	0.083	0.3	0.12
Calcium	W-3	6	8.5	28.0	1.5	13.0
Chemical Oxygen Demand (COD)	W-3	6	<50.0	<50.0	<50.0	

Table V-282 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT W

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Chloride	W-3	6	3.0	520.0	73.0	28.0
Cobalt	W-3	6	<0.03	<0.025	<0.03	<0.03
Fluoride	W-3	6	0.2	34.0	31.0	26.0
Iron	W-3	6	0.072	0.3	<0.03	0.11
Magnesium	W-3	6	2.0	0.06	3.4	2.9
Manganese	W-3	6	11.0	<0.1	0.3	0.2
Molybdenum	W-3	6	0.08	<0.03	<0.03	<0.03
Phosphorus	W-3	6	<0.18	<0.18	<0.18	
Sodium	W-3	6	14.0	390.0	170.0	110.0
Sulfate	W-3	6	6.2	8.5	8.5	25.0
Tin	W-3	6	<0.25	<0.25	<0.25	<0.25

Table V-282 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT W

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Titanium	W-3	6	<0.2	<0.25	<0.2	<0.2
Total Dissolved Solids (TDS)	W-3	6	52.0	1,400.0	590.0	520.0
Total Organic Carbon (TOC)	W-3	6	250.0	20.0	<1.0	
Total Solids (TS)	W-3	6	80.0	1,300.0	660.0	480.0
Vanadium	W-3	6	<0.03	<0.03	<0.03	<0.03
Yttrium	W-3	6	<0.1	<0.1	<0.1	<0.1
Zirconium	W-3	6	140	13	11	4.8
Conventional Pollutants						
Oil and Grease	W-3	1	6.0	71.0	9.0	
Total Suspended Solids (TSS)	W-3	6	1.0	1.0	<1.0	<1.0
pH (standard units)	W-3	6	6-7	7	7	7

1. The following toxic pollutants were not detected at this plant: 1-10, 12, 13, 15-21, 24-43, 45-65, 67, 68, 70-85, 87, and 88.

2. No analyses were performed on the following toxic pollutants: 89-113, 116, and 129.

Table V-283

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT X

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	X-4	1	<0.2	<0.2	<0.2	<0.2
	X-6	4	<0.2	<0.2	<0.2	<0.2
115. arsenic	X-4	1	<0.005	<0.005	<0.005	<0.005
	X-6	4	<0.005	<0.005	<0.005	<0.005
117. beryllium	X-4	1	<0.02	<0.02	<0.02	<0.02
	X-6	4	<0.02	<0.02	<0.02	<0.02
118. cadmium	X-4	1	<0.03	0.07	0.05	0.04
	X-6	4	<0.03	<0.03	<0.03	<0.03
119. chromium (total)	X-4	1	<0.02	0.02	<0.02	<0.03
	X-6	4	<0.02	<0.02	<0.02	<0.02
120. copper	X-4	1	<0.05	0.8	0.5	0.4
	X-6	4	<0.05	<0.05	0.02	0.024
122. lead	X-4	1	<0.1	7.1	7.0	4.5
	X-6	4	<0.1	0.12	<0.1	0.11
123. mercury	X-4	1	<0.005	<0.005	<0.005	<0.005
	X-6	4	<0.005	<0.005	<0.005	<0.005
124. nickel	X-4	1	<0.1	7.0	6.8	4.6
	X-6	4	<0.1	0.17	0.14	0.3

Table V-283 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT X

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
125. selenium	X-4	1	<0.005	<0.005	<0.005	<0.005
	X-6	4	<0.005	<0.005	<0.005	<0.005
126. silver	X-4	1	0.002	0.57	0.37	0.48
	X-6	4	0.002	<0.002	0.006	1.9
127. thallium	X-4	1	<0.005	0.11	0.075	0.082
	X-6	4	<0.005	0.075	0.055	0.052
128. zinc	X-4	1	0.074	<0.02	<0.03	<0.03
	X-6	4	0.074	0.025	0.1	0.2
Nonconventional Pollutants						
Acidity	X-4	1	11	11	11	130
	X-6	4	11	<10	<10	<10
Alkalinity	X-4	1	122	129	135	172
	X-6	4	122	362	119	75
Aluminum	X-4	1	0.12	0.22	0.1	<0.1
	X-6	4	0.12	1.0	2.1	1.8
Barium	X-4	1	<0.02	<0.02	<0.02	<0.02
	X-6	4	<0.02	<0.02	<0.02	<0.02

Table V-283 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT X

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutant (Continued)						
Boron	X-4	1	0.073	2.6	3.0	4.2
	X-6	4	0.073	1.6	17	3.4
Calcium	X-4	1	31	30	36	36
	X-6	4	31	17	25	35
Cobalt	X-4	1	<0.02	<0.02	<0.03	<0.03
	X-6	4	<0.02	<0.02	<0.03	<0.03
Columbium	X-4	1	ND	ND	ND	ND
	X-6	4	ND	0.12	1.8	3.4
Fluoride	X-4	1	1.1	1.6	1.5	1.0
	X-6	4	1.1	170	200	160
Iron	X-4	1	0.052	2.3	2.0	1.1
	X-6	4	0.052	0.1	0.3	0.3
Magnesium	X-4	1	10	9.1	11	11
	X-6	4	10	0.91	6.0	8.2

Table V-283 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT X

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	X-4	1	<0.01	0.05	0.07	0.04
	X-6	4	<0.01	<0.01	<0.01	<0.01
Molybdenum	X-4	1	<0.03	0.7	0.6	0.6
	X-6	4	<0.03	<0.03	<0.03	<0.03
Sodium	X-4	1	23	2,000	1,400	1,600
	X-6	4	23	980	830	840
Tantalum	X-4	1	ND	ND	ND	ND
	X-6	4	ND	5.8	6.15	12
Tin	X-4	1	<0.5	<0.5	<0.5	<0.5
	X-6	4	<0.5	<0.5	<0.5	<0.5
Titanium	X-4	1	<0.2	<0.2	<0.2	<0.2
	X-6	4	<0.2	1.0	0.7	0.6
Total Dissolved Solids	X-4	1	2,400	5,200	3,700	4,200
(TDS)	X-6	4	2,400	3,100	2,900	2,600
Total Solids (TS)	X-4	1	2,600	5,200	3,700	8,100
	X-6	4	2,600	3,000	3,000	2,800
Tungsten	X-4	1	ND	14	8.9	13.5
	X-6	4	ND	0.42	1.45	2.2

Table V-283 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT X

Pollutant	Stream Code	Sample Type	Concentrations (mg/l)			
			Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Vanadium	X-4	1	<0.1	<0.1	<0.1	<0.1
	X-6	4	<0.1	<0.1	<0.1	<0.1
Yttrium	X-4	1	<0.0001	<0.1	<0.1	<0.1
	X-6	4	<0.0001	<0.1	<0.1	<0.1
Conventional Pollutants (Continued)						
Oil and Grease	X-4	1	4	7	2	8
	X-6	1	4	15	<1	13
Total Suspended Solids (TSS)	X-4	1	<1	5	17	150
	X-6	4	<1	<1	200	200
pH (standard units)	X-4	1	7.06	7.95	8.03	8.10
	X-6	4	7.06	11.58	10.87	10.46

1. No analyses were performed on the following toxic pollutants: 1-113, 116, 121, and 129.

Table V-284

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Y

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	Y-13	6	0.0002	0.0002	<0.0002	<0.0002
115. arsenic	Y-13	6	0.002	0.002	<0.001	0.005
117. beryllium	Y-13	6	<0.02	<0.02	<0.02	<0.02
118. cadmium	Y-13	6	<0.03	<0.03	<0.03	<0.03
119. chromium (total)	Y-13	6	<0.02	<0.02	0.02	0.032
120. copper	Y-13	6	<0.02	0.02	<0.02	<0.02
121. cyanide (total)	Y-13	1	0.03	0.48	0.45	0.07
122. lead	Y-13	6	0.067	0.14	0.14	0.15

Table V-284 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Y

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
123. mercury	Y-13	6	<0.005	<0.005	<0.005	<0.005
124. nickel	Y-13	6	0.1	0.3	0.3	0.7
125. selenium	Y-13	6	<0.001	<0.001	<0.001	<0.001
126. silver	Y-13	6	<0.0005	<0.0005	0.0006	<0.0005
127. thallium	Y-13	6	<0.001	<0.001	<0.001	0.003
128. zinc	Y-13	6	0.08	<0.03	<0.03	<0.03
Nonconventional Pollutants						
Acidity	Y-13	6	11.0	<10.0	21.0	40.0
Alkalinity	Y-13	6	31.0	44.0	28.0	31.0

Table V-284 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Y

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Aluminum	Y-13	6	0.03	0.2	0.5	0.1
Barium	Y-13	6	<0.02	<0.02	<0.02	<0.02
Boron	Y-13	6	2.2	2.1	0.7	1.0
Calcium	Y-13	6	12.0	8,000.0	3,100.0	4,300.0
Cobalt	Y-13	6	<0.03	0.03	<0.03	0.042
Fluoride	Y-13	6	290.0	20.0	11.0	11.0
Iron	Y-13	6	0.061	0.2	0.1	0.2
Magnesium	Y-13	6	1.8	23.0	23.0	30.0

Table V-284 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT Y

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Manganese	Y-13	6	<0.01	<0.01	<0.01	0.02
Molybdenum	Y-13	6	0.056	1.5	1.1	0.9
Sodium	Y-13	6	14.0	880.0	1,200.0	960.0
Tin	Y-13	6	<1.0	<1.0	<1.0	<1.0
Titanium	Y-13	6	0.5	0.2	0.4	0.2
Total Dissolved Solids (TDS)	Y-13	6	120.0	9,984.0	110.0	84.0
Total Solids (TS)	Y-13	6	120.0	9,500.0	160.0	200.0
Vanadium	Y-13	6	<0.1	<0.1	<0.1	<0.1
Yttrium	Y-13	6	<0.1	<0.1	<0.1	<0.1

Table V-284 (Continued)

WASTEWATER TREATMENT PERFORMANCE DATA - PLANT V

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Conventional Pollutants						
Oil and Grease	Y-13	1	1.0	2.0	7.0	<1.0
Total Suspended Solids (TSS)	Y-13	6	54.0	65.0	40.0	15.0
pH (standard units)	Y-13	6	6	10	7	7

NA - Not analyzed.

1. No analyses were performed on the following toxic pollutants: 1-113, 116, and 129.

Table V-285

WATERWATER TREATMENT PERFORMANCE DATA - PLANT Z

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants						
114. antimony	Z-5	1	0.0004	0.0066		
	Z-6	1	0.0004	0.00025		
	Z-7	1	0.0004	0.00025		
115. arsenic	Z-5	1	<0.001	0.34		
	Z-6	1	<0.001	0.0053		
	Z-7	1	<0.001	<0.001		
117. beryllium	Z-5	1	<0.01	0.03		
	Z-6	1	<0.01	<0.01		
	Z-7	1	<0.01	<0.01		
118. cadmium	Z-5	1	<0.01	0.074		
	Z-6	1	<0.01	<0.01		
	Z-7	1	<0.01	0.026		
119. chromium (total)	Z-5	1	0.038	13		
	Z-6	1	0.038	1		
	Z-7	1	0.038	0.07		
120. copper	Z-5	1	0.013	0.5		
	Z-6	1	0.013	0.042		
	Z-7	1	0.013	0.031		
122. lead	Z-5	1	0.097	1.102		
	Z-6	1	0.097	0.62		
	Z-7	1	0.097	0.15		
123. mercury	Z-5	1	<0.005	<0.005		
	Z-6	1	<0.005	<0.005		
	Z-7	1	<0.005	<0.005		
124. nickel	Z-5	1	0.038	0.48		
	Z-6	1	0.038	0.084		
	Z-7	1	0.038	0.059		
125. selenium	Z-5	1	0.0004	0.0011		
	Z-6	1	0.0004	0.0016		
	Z-7	1	0.0004	0.0004		
126. silver	Z-5	1	0.0005	0.0022		
	Z-6	1	0.0005	0.057		
	Z-7	1	0.0005	0.044		

Table V-285 (Continued)

WATERWATER TREATMENT PERFORMANCE DATA - PLANT Z

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Toxic Pollutants (Continued)						
127. thallium	Z-5	1	<0.001	0.0036		
	Z-6	1	<0.001	0.064		
	Z-7	1	<0.001	0.027		
128. zinc	Z-5	1	<0.25	0.41		
	Z-6	1	<0.25	0.053		
	Z-7	1	<0.25	0.036		
Nonconventional Pollutants						
Acidity	Z-6	1	<10	<10		
	Z-7	1	<10	27		
Alkalinity	Z-6	1	69	925		
	Z-7	1	69	57		
Aluminum	Z-5	1	0.11	36		
	Z-6	1	0.11	2.4		
	Z-7	1	0.11	0.23		
Barium	Z-5	1	0.04	0.34		
	Z-6	1	0.04	0.2		
	Z-7	1	0.04	0.128		
Boron	Z-5	1	0.5	7.7		
	Z-6	1	0.5	3.4		
	Z-7	1	0.5	1.2		
Calcium	Z-5	1	79	28,000		
	Z-6	1	79	9,300		
	Z-7	1	79	1,400		
Cobalt	Z-5	1	<0.01	0.5		
	Z-6	1	<0.01	0.059		
	Z-7	1	<0.01	0.031		
Columbium	Z-5	1	ND	98		
	Z-6	1	ND	3.5		
	Z-7	1	ND	ND		
Fluoride	Z-5	1	0.2	10		
	Z-6	1	0.2	5.3		
	Z-7	1	0.2	5.9		

Table V-285 (Continued)

WATERWATER TREATMENT PERFORMANCE DATA - PLANT Z

Pollutant	Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Continued)						
Iron	Z-5	1	0.24	0.53		
	Z-6	1	0.24	83		
	Z-7	1	0.24	0.52		
Magnesium	Z-5	1	8.0	83		
	Z-6	1	8.0	4.6		
	Z-7	1	8.0	0.31		
Manganese	Z-5	1	0.012	81		
	Z-6	1	0.012	3.2		
	Z-7	1	0.012	0.11		
Molybdenum	Z-5	1	<0.03	0.26		
	Z-6	1	<0.03	0.12		
	Z-7	1	<0.03	0.13		
Sodium	Z-5	1	27	760		
	Z-6	1	27	1,200		
	Z-7	1	27	1,200		
Tantalum	Z-5	1	ND	90		
	Z-6	1	ND	3		
	Z-7	1	ND	ND		
Tin	Z-5	1	<0.28	0.87		
	Z-6	1	<0.28	<0.28		
	Z-7	1	<0.28	<0.28		
Titanium	Z-5	1	<0.25	170		
	Z-6	1	<0.25	11		
	Z-7	1	<0.25	<0.25		

Table V-285 (Continued)

WATERWATER TREATMENT PERFORMANCE DATA - PLANT Z

Pollutant		Stream Code	Sample Type	Concentrations (mg/l) Source	Day 1	Day 2	Day 3
Nonconventional Pollutants (Cont.)							
Total Dissolved Solids (TDS)	Z-6	1	110	1,000			
	Z-7	1	110	39			
Total Solids (TS)	Z-6	1	390	1,800			
	Z-7	1	390	110			
Vanadium	Z-5	1	<0.02	7.9			
	Z-6	1	<0.02	0.55			
	Z-7	1	<0.02	0.02			
Yttrium	Z-5	1	<0.25	<0.25			
	Z-6	1	<0.25	<0.25			
	Z-7	1	<0.25	<0.25			
Zirconium	Z-5	1	0.26	6.7			
	Z-6	1	0.26	1.4			
	Z-7	1	0.26	<0.25			
Conventional Pollutants							
Oil and Grease	Z-5	1	<1	1			
	Z-6	1	<1	2			
	Z-7	1	<1	3			
Total Suspended Solids (TSS)	Z-6	1	100	570			
	Z-7	1	100	45			
pH (standard units)	Z-5	1	6	12			
	Z-6	1	6	12			
	Z-7	1	6	6			

1. No analyses were performed on the following toxic pollutants: 1 - 113, 116, 121, and 129.

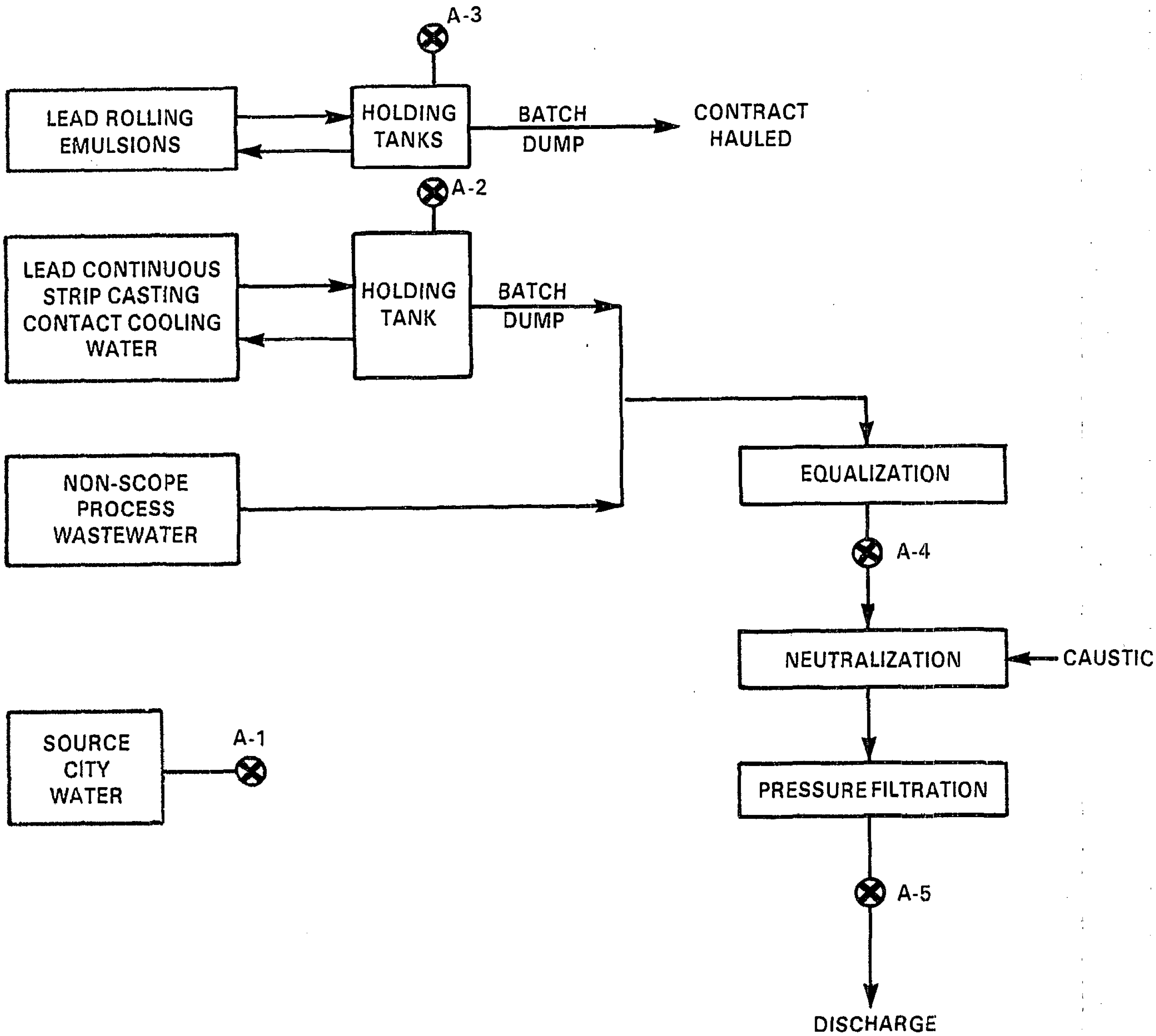


FIGURE V-1

WASTEWATER SOURCES AT PLANT A

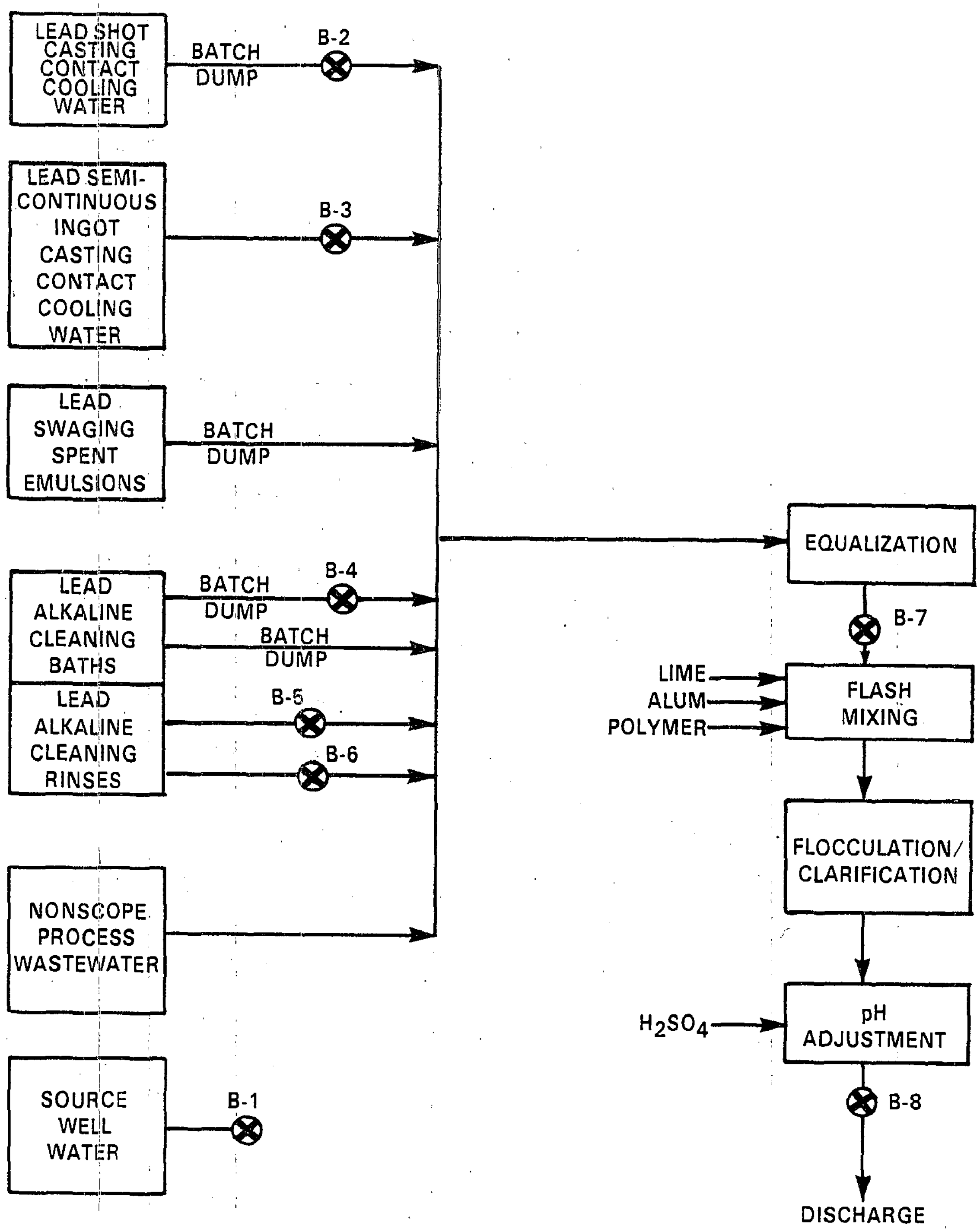


FIGURE V-2

WASTEWATER SOURCES AT PLANT B

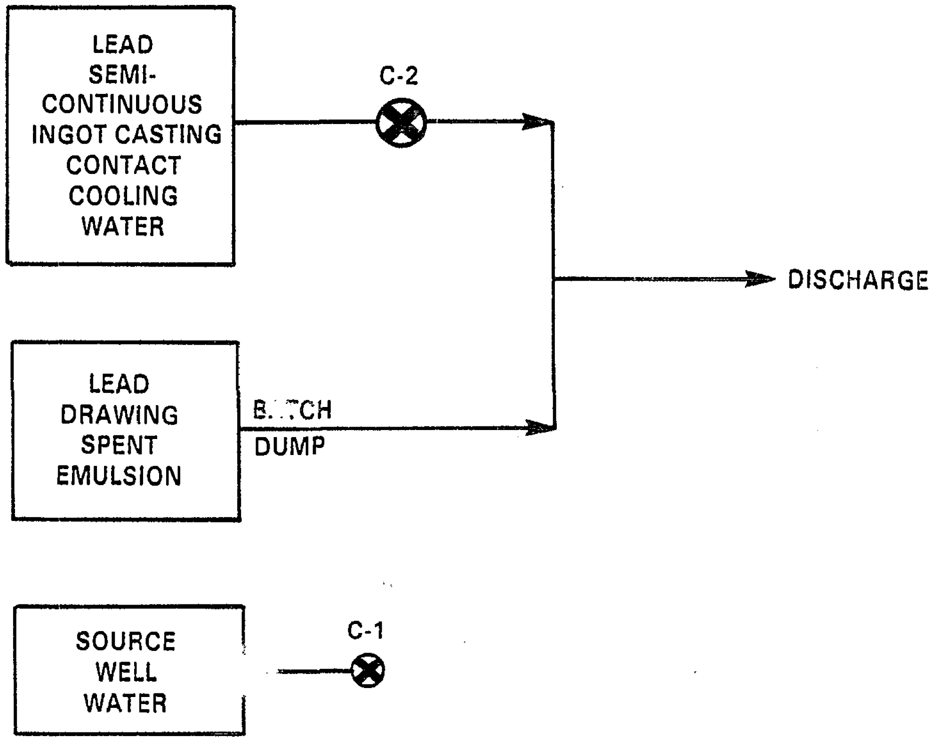


FIGURE V-3

WASTEWATER SOURCES AT PLANT C

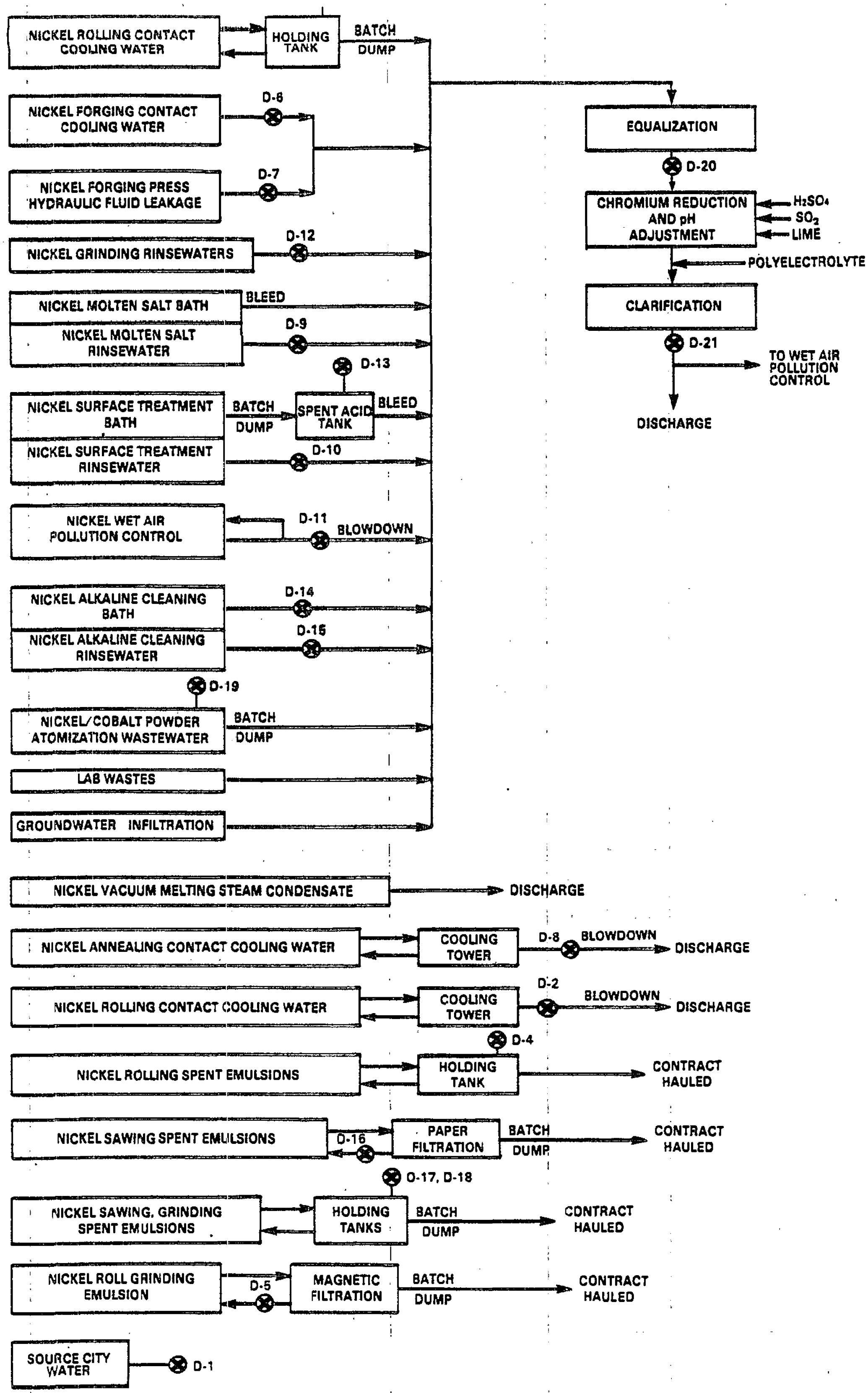


FIGURE V-4

WASTEWATER SOURCES AT PLANT D

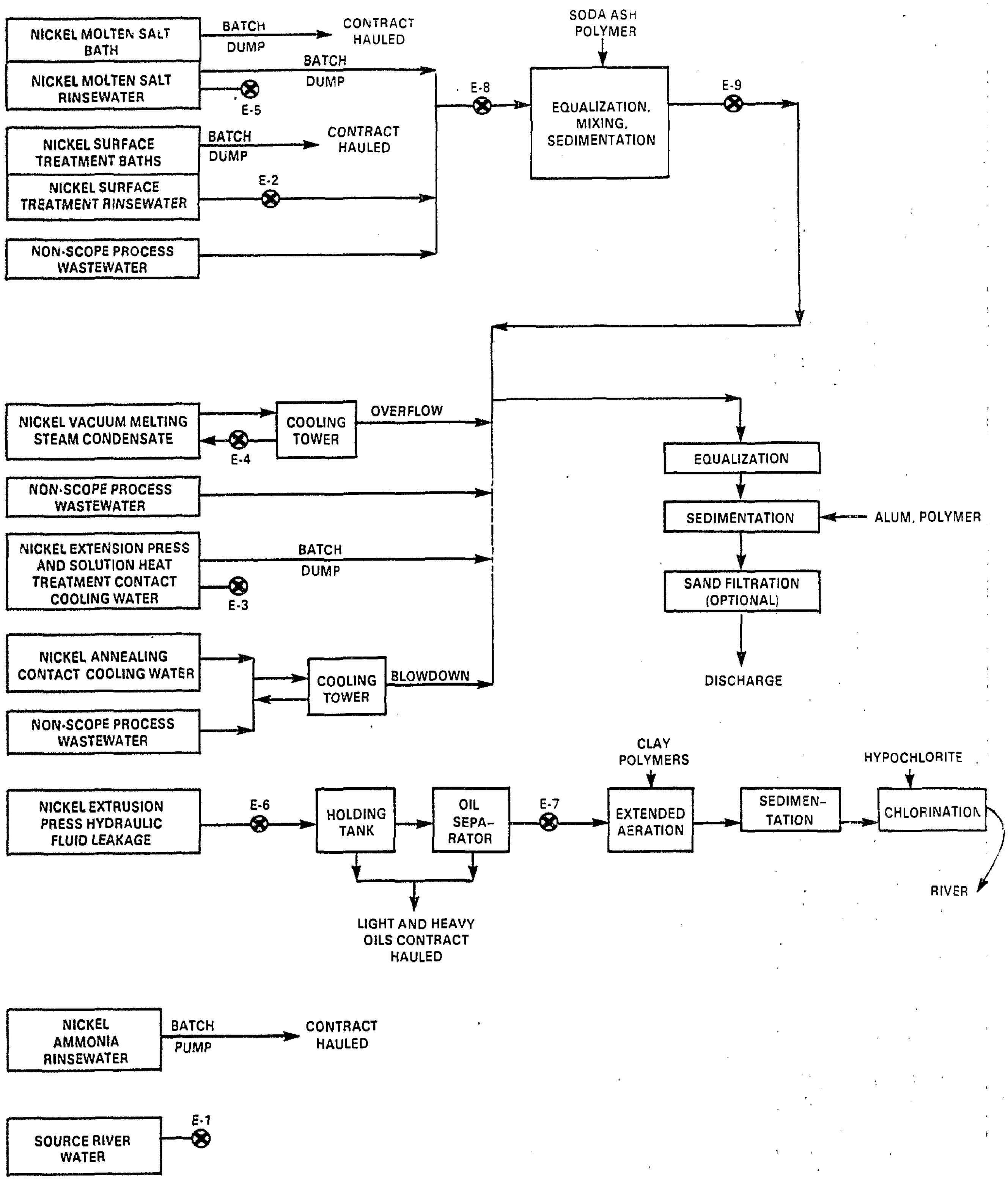


FIGURE V-5

WASTEWATER SOURCES AT PLANT E

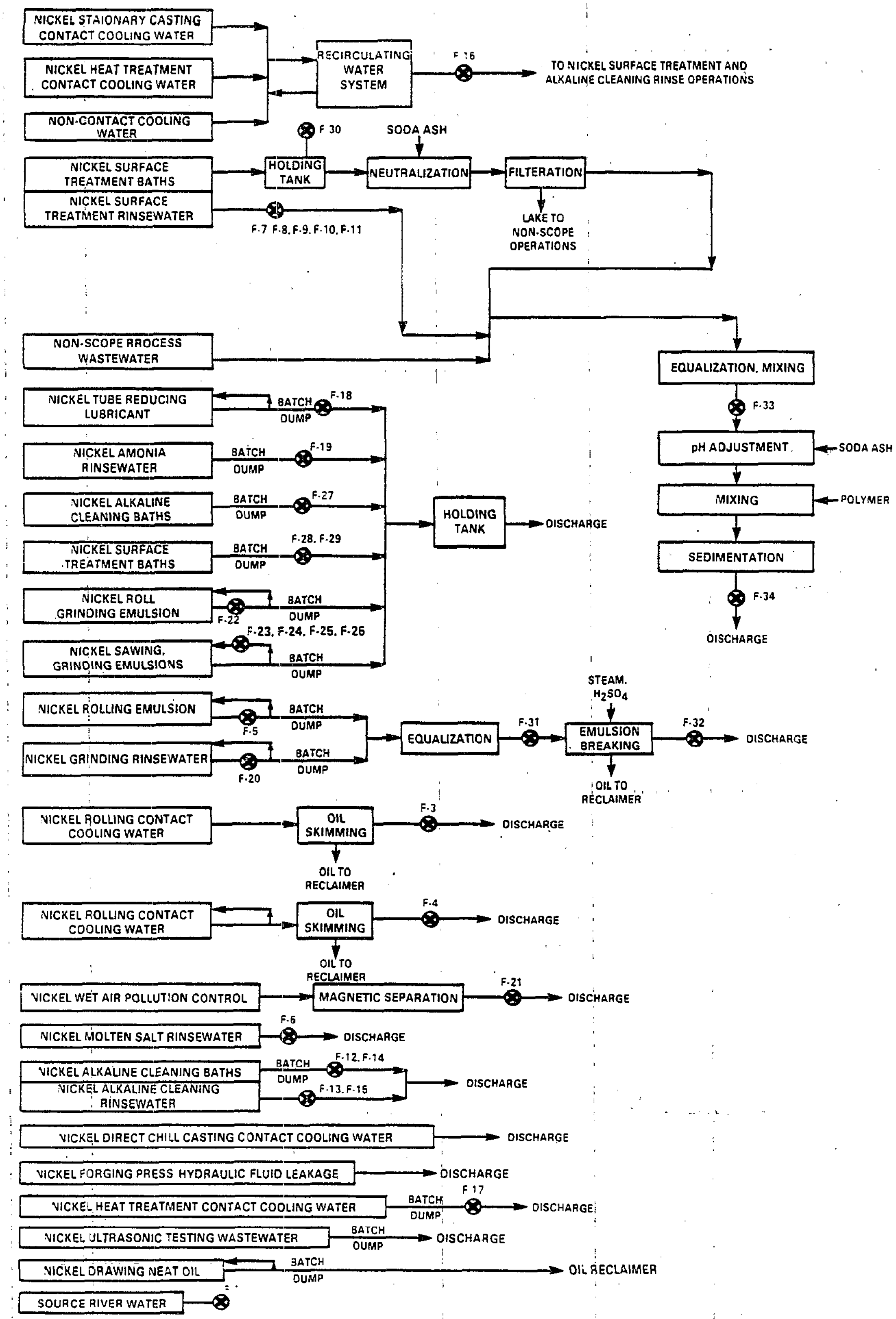
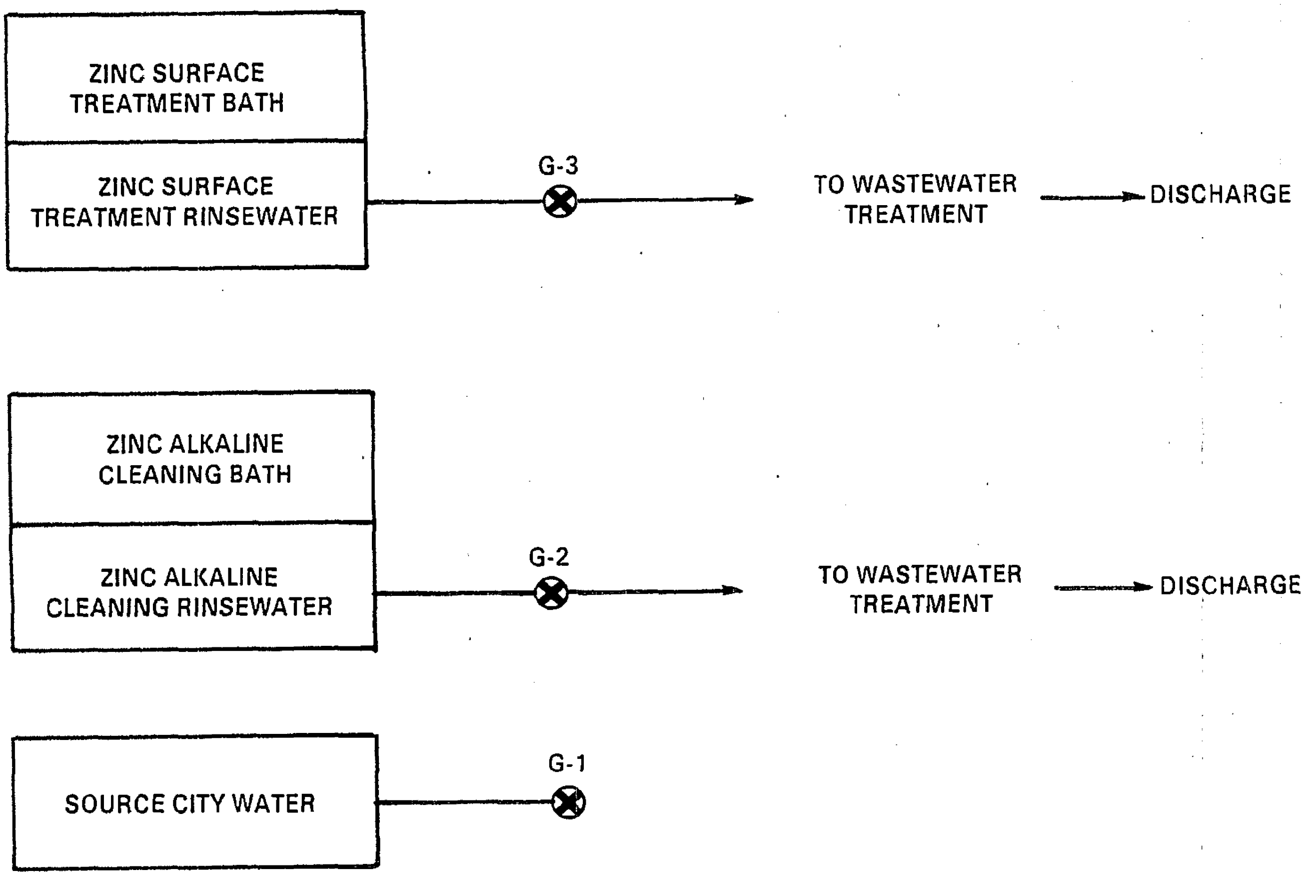


FIGURE V-6

WASTEWATER SOURCES AT PLANT F



FIGURES V-7

WASTEWATER SOURCES AT PLANT G

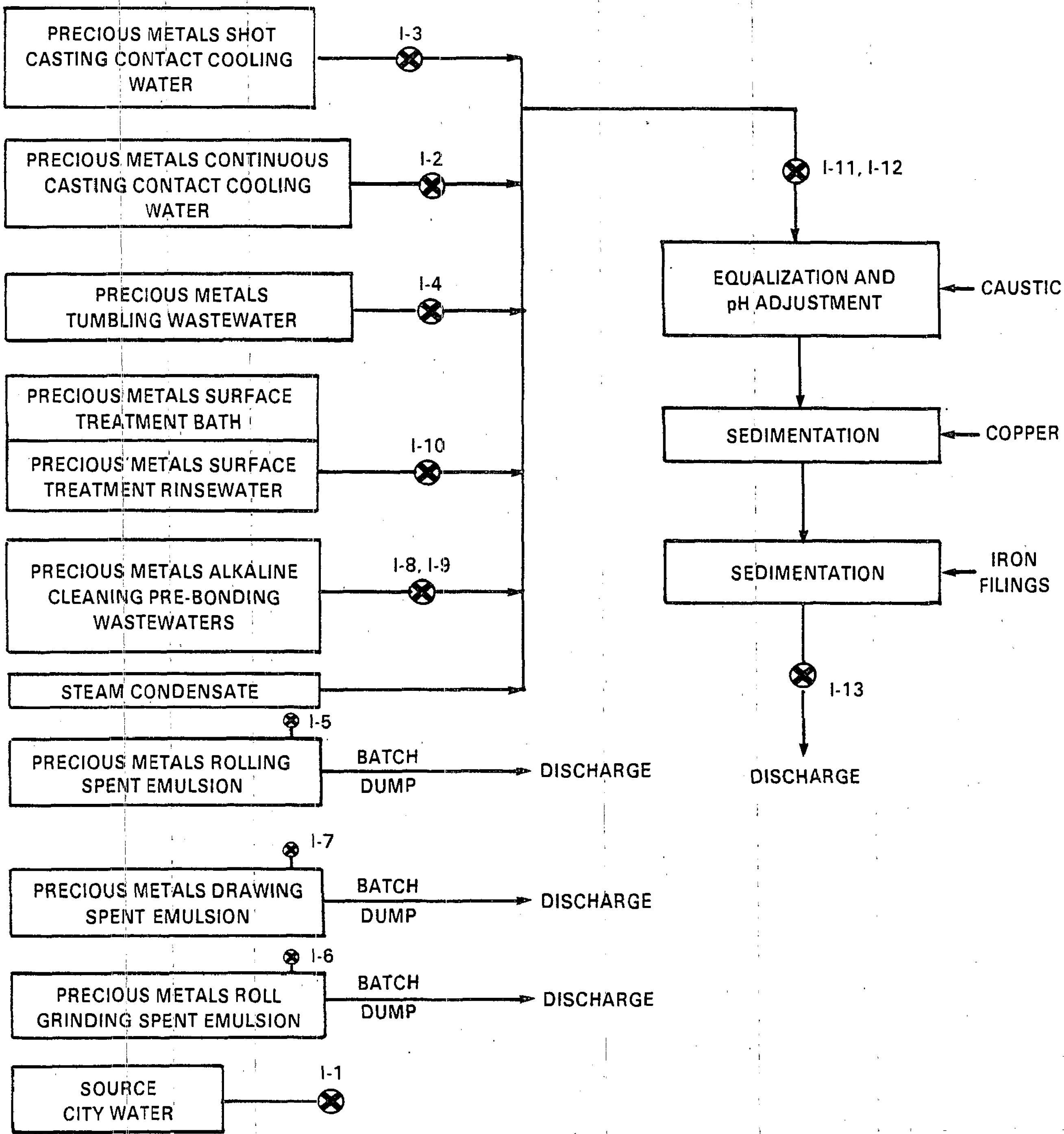


FIGURE V-8

WASTEWATER SOURCES AT PLANT I

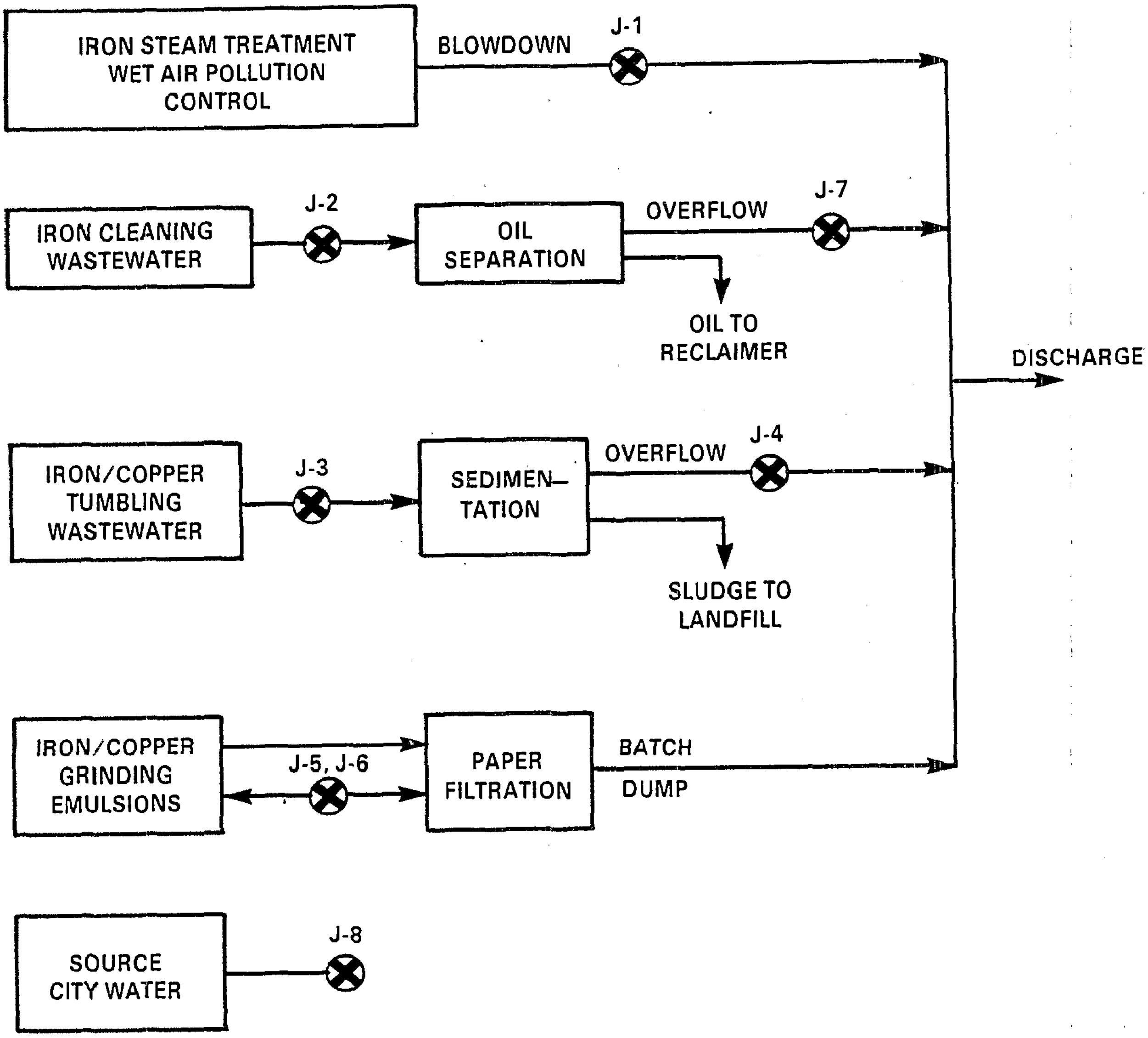


FIGURE V-9

WASTEWATER SOURCES AT PLANT J

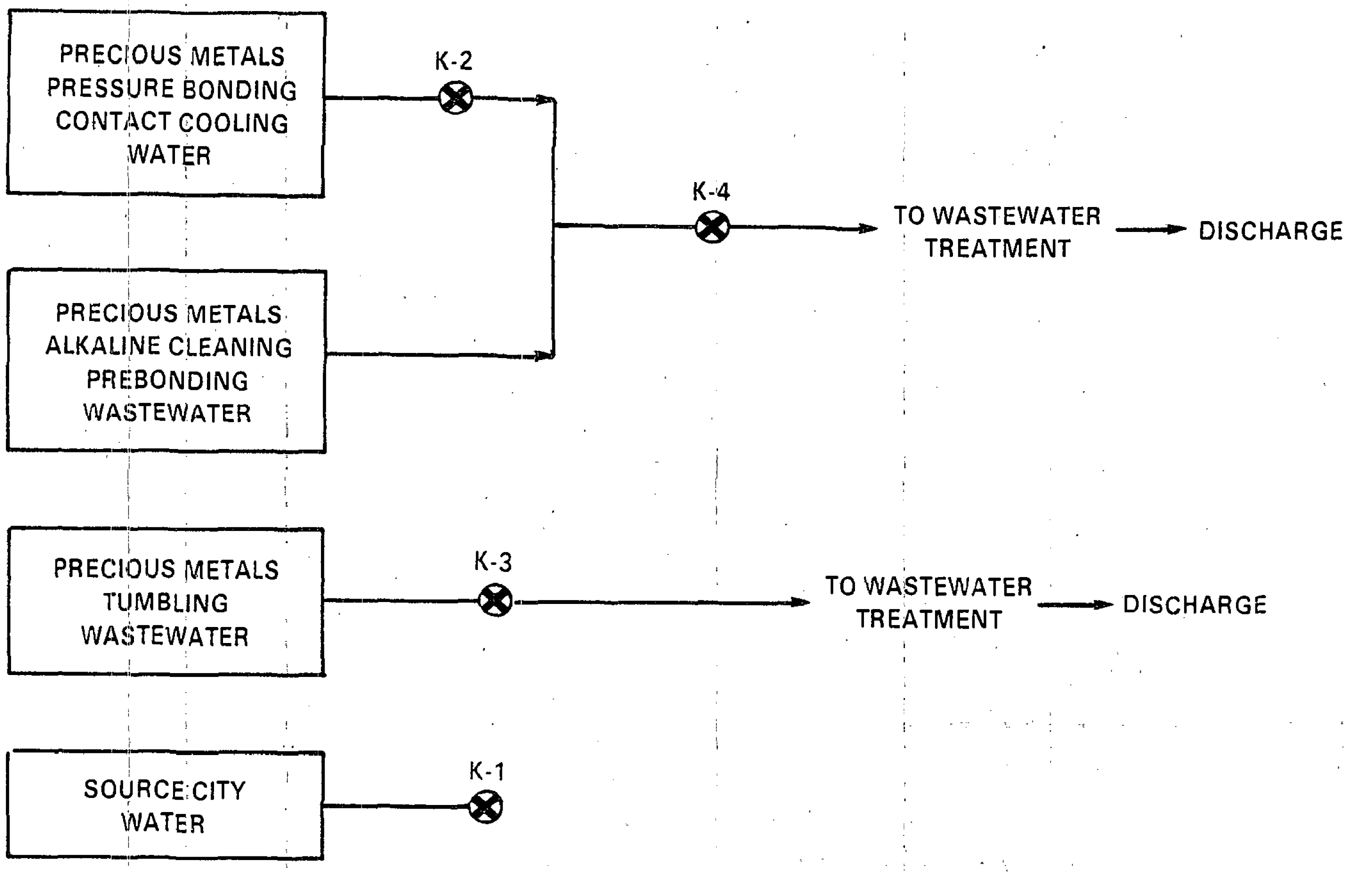


FIGURE V-10

WASTEWATER SOURCES AT PLANT K

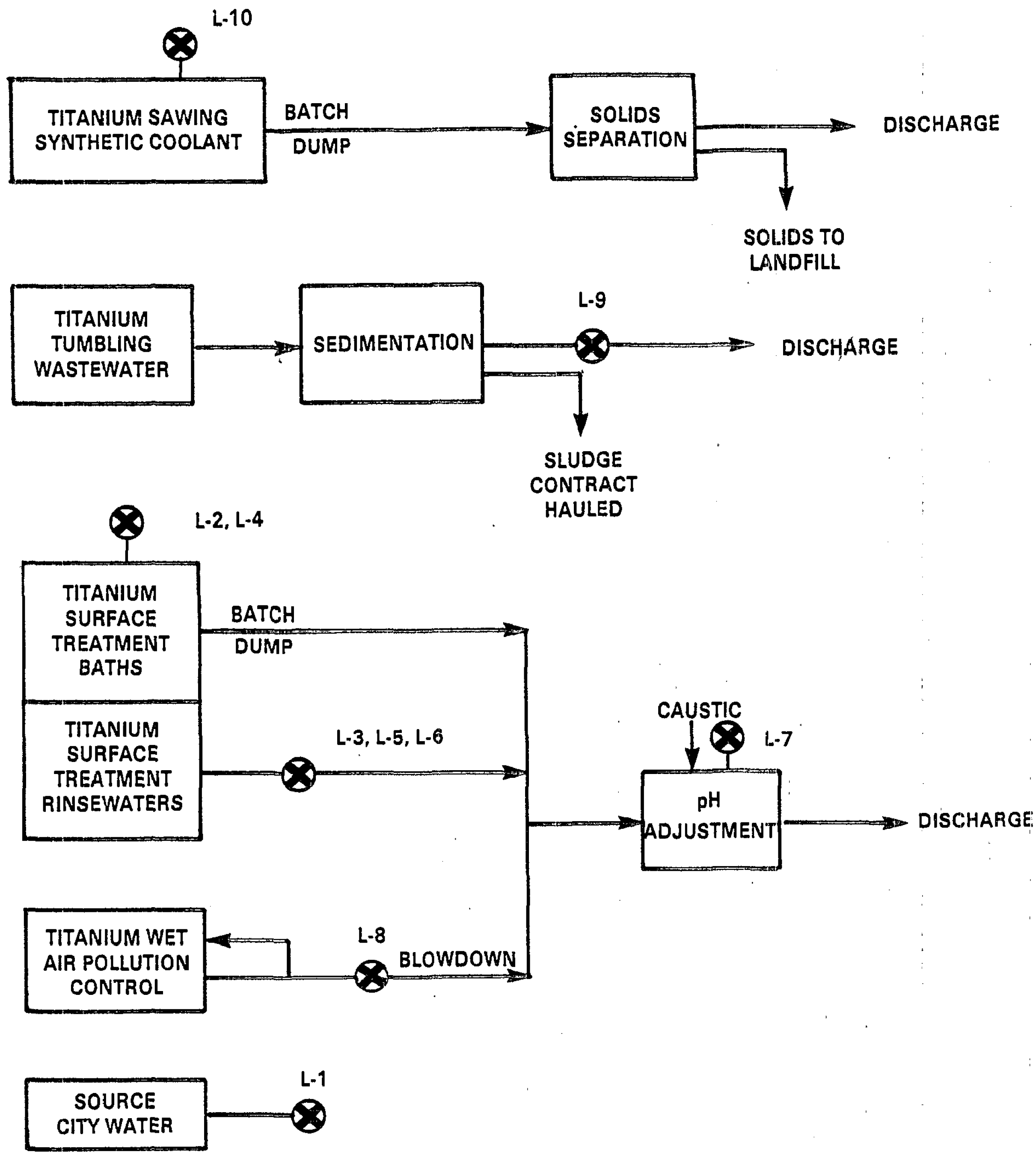


FIGURE V-11

WASTEWATER SOURCES AT PLANT L

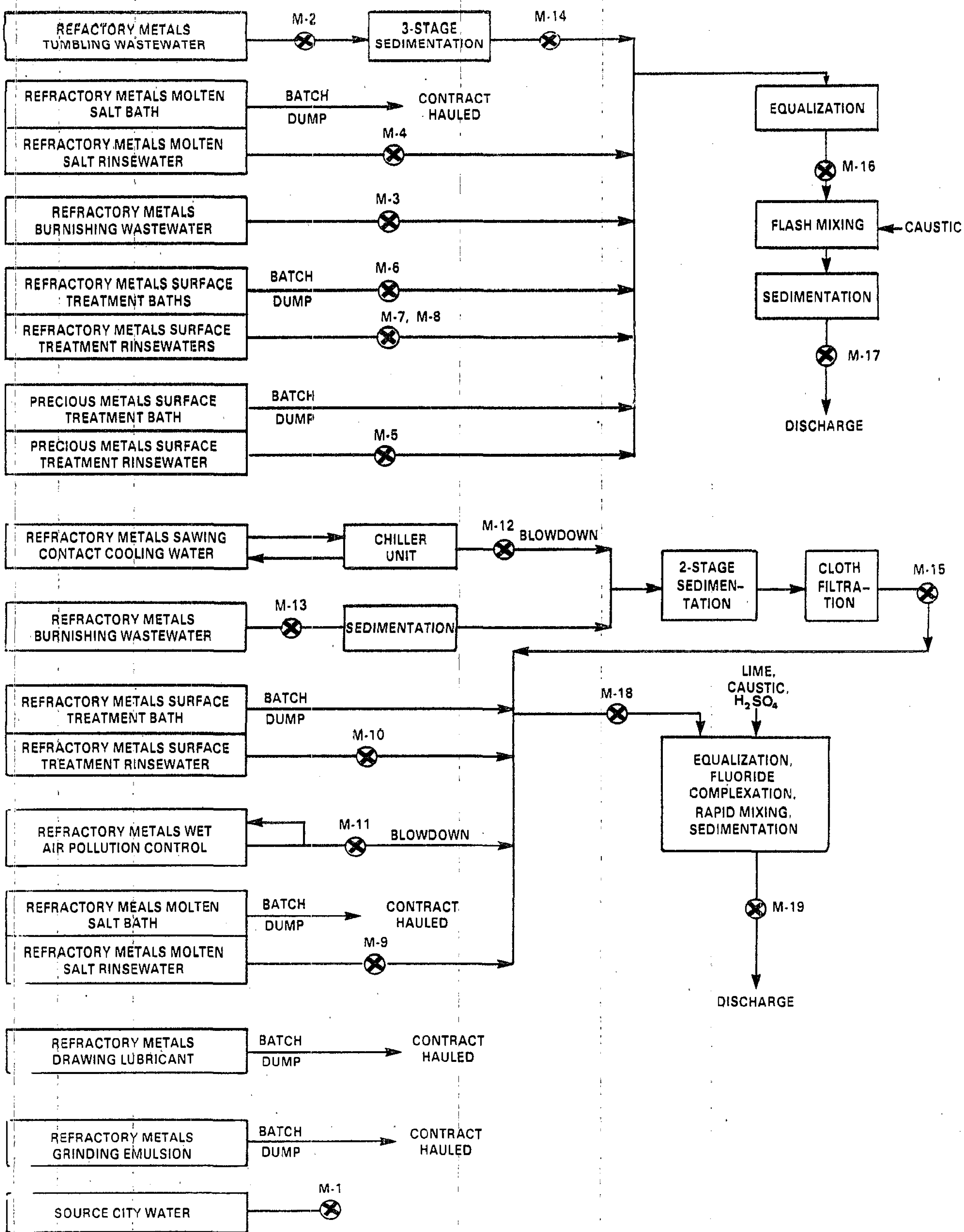


FIGURE V-12

WASTEWATER SOURCES AT PLANT M

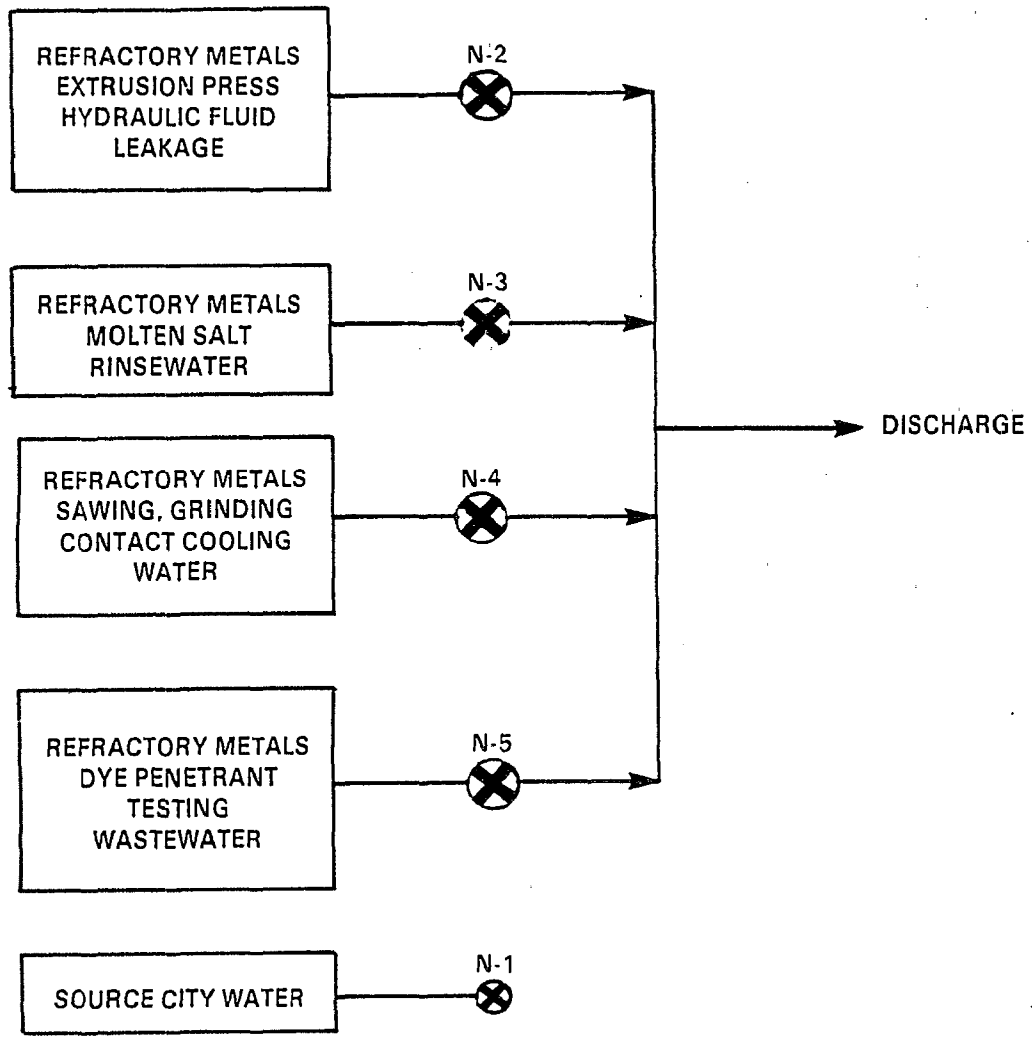


FIGURE V-13

WASTEWATER SOURCES AT PLANT N

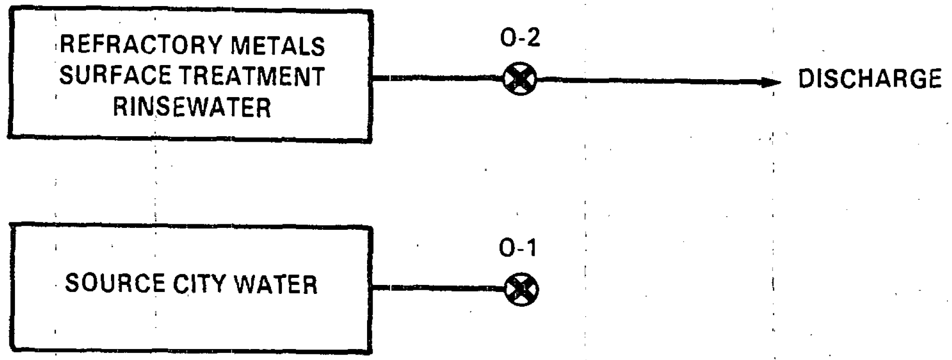


FIGURE V-14

WASTEWATER SOURCES AT PLANT O

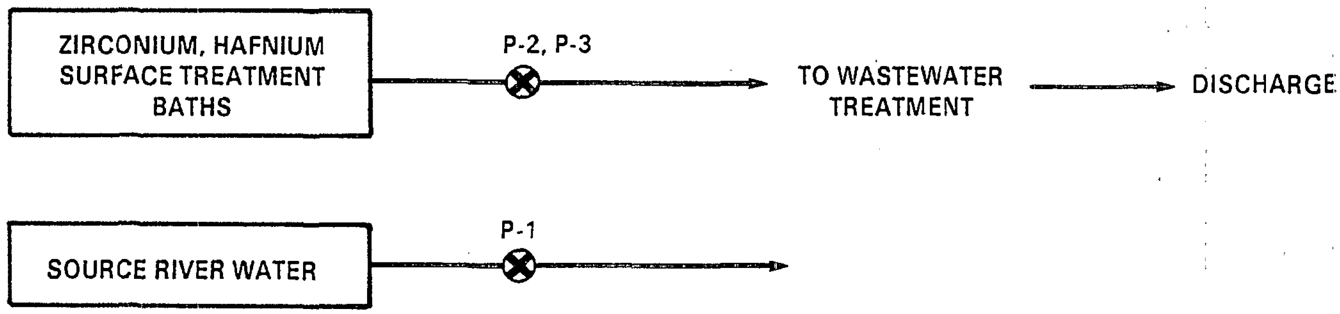


FIGURE V-15

WASTEWATER SOURCES AT PLANT P

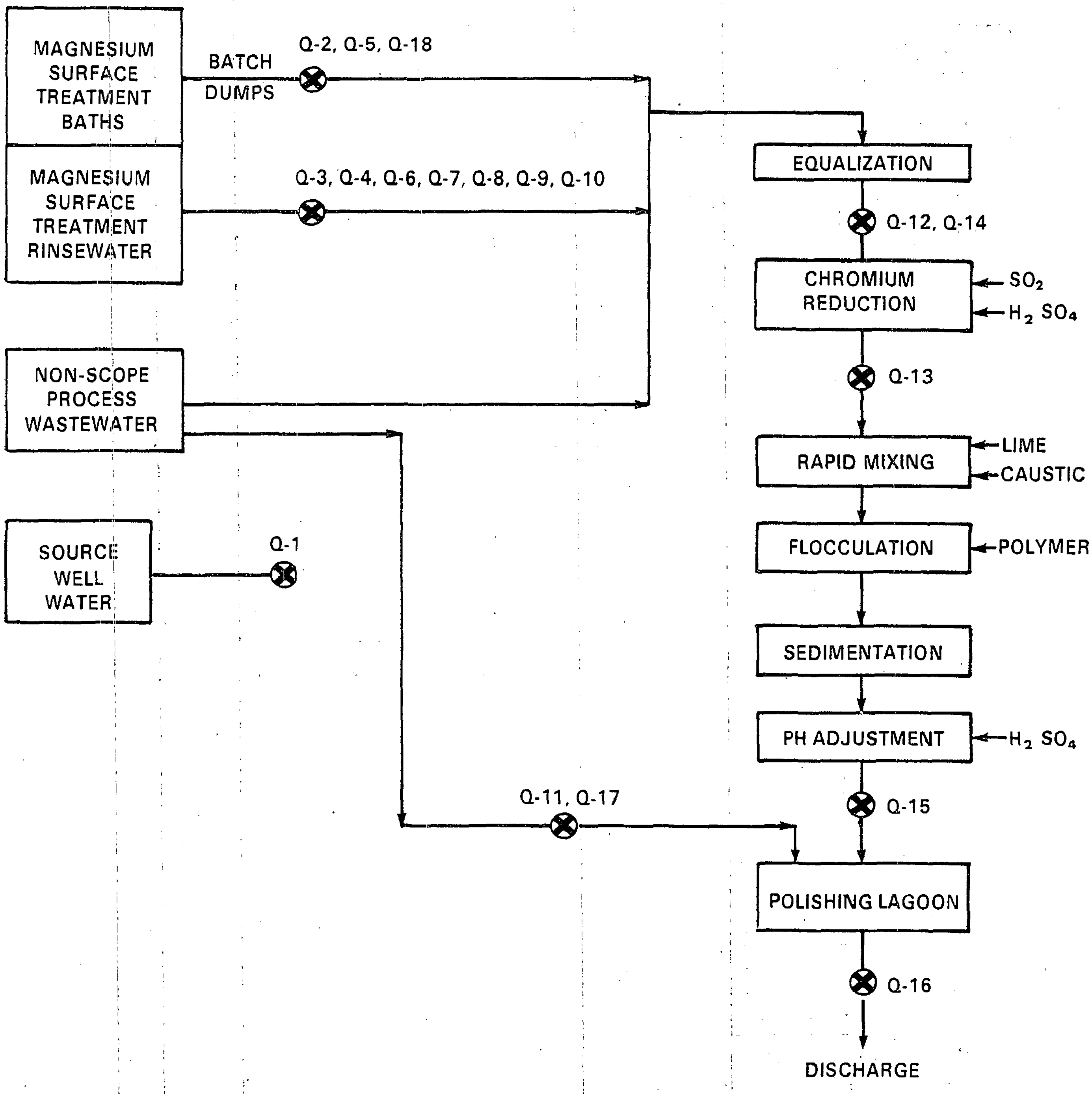


FIGURE V-16

WASTEWATER SOURCES AT PLANT Q

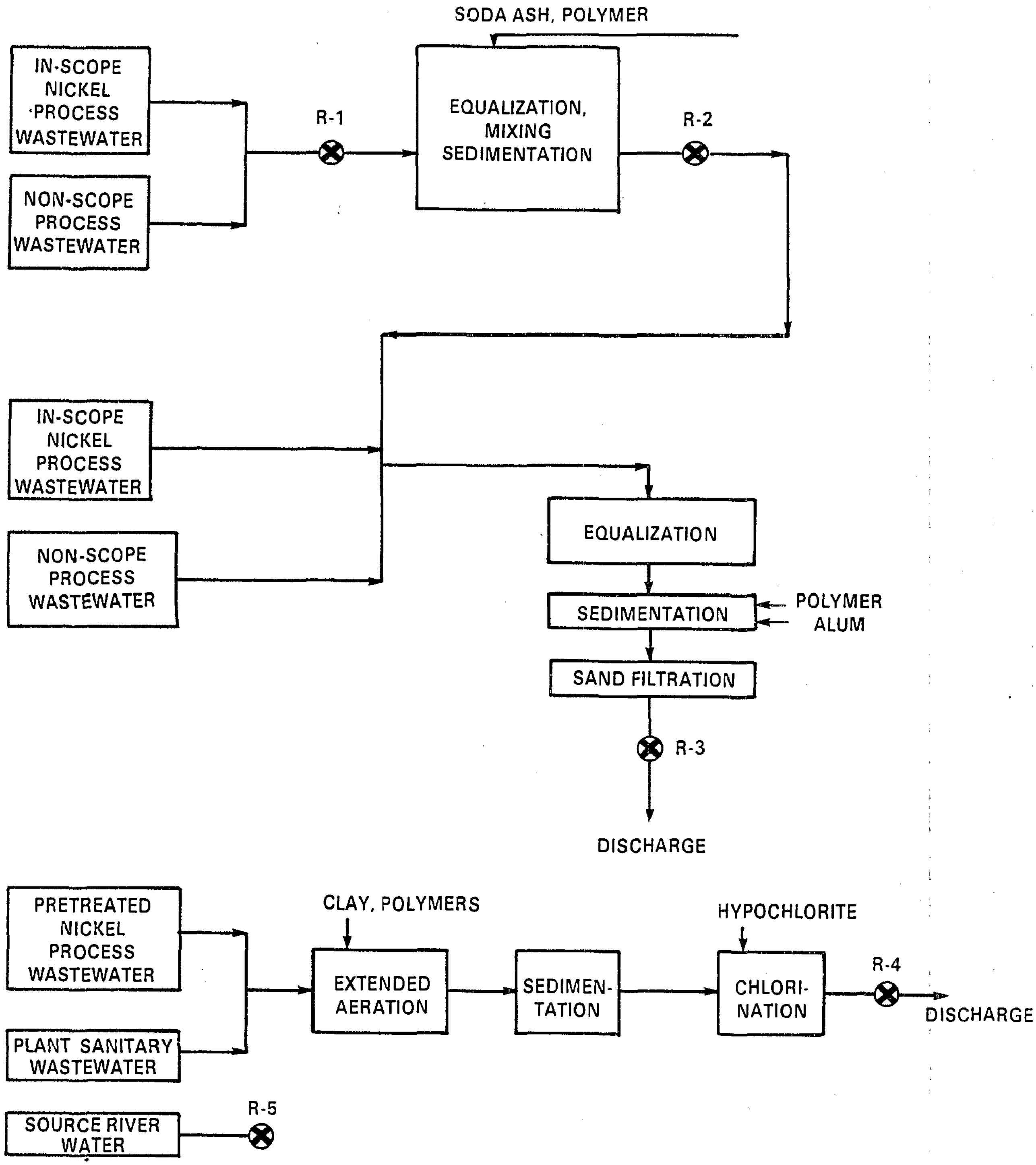


FIGURE V-17

WASTEWATER SOURCES AT PLANT R

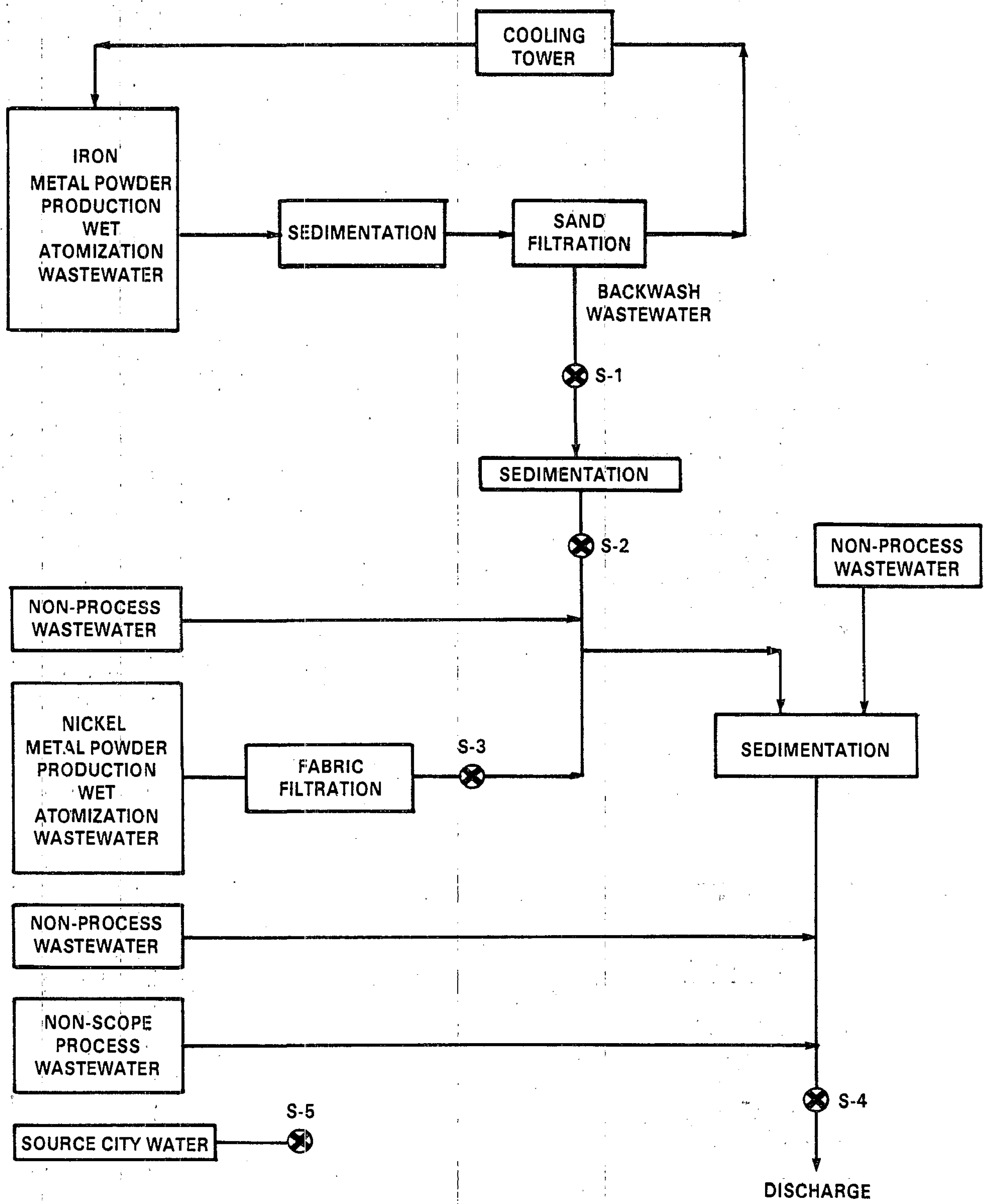


FIGURE V-18

WASTEWATER SOURCES AT PLANT S

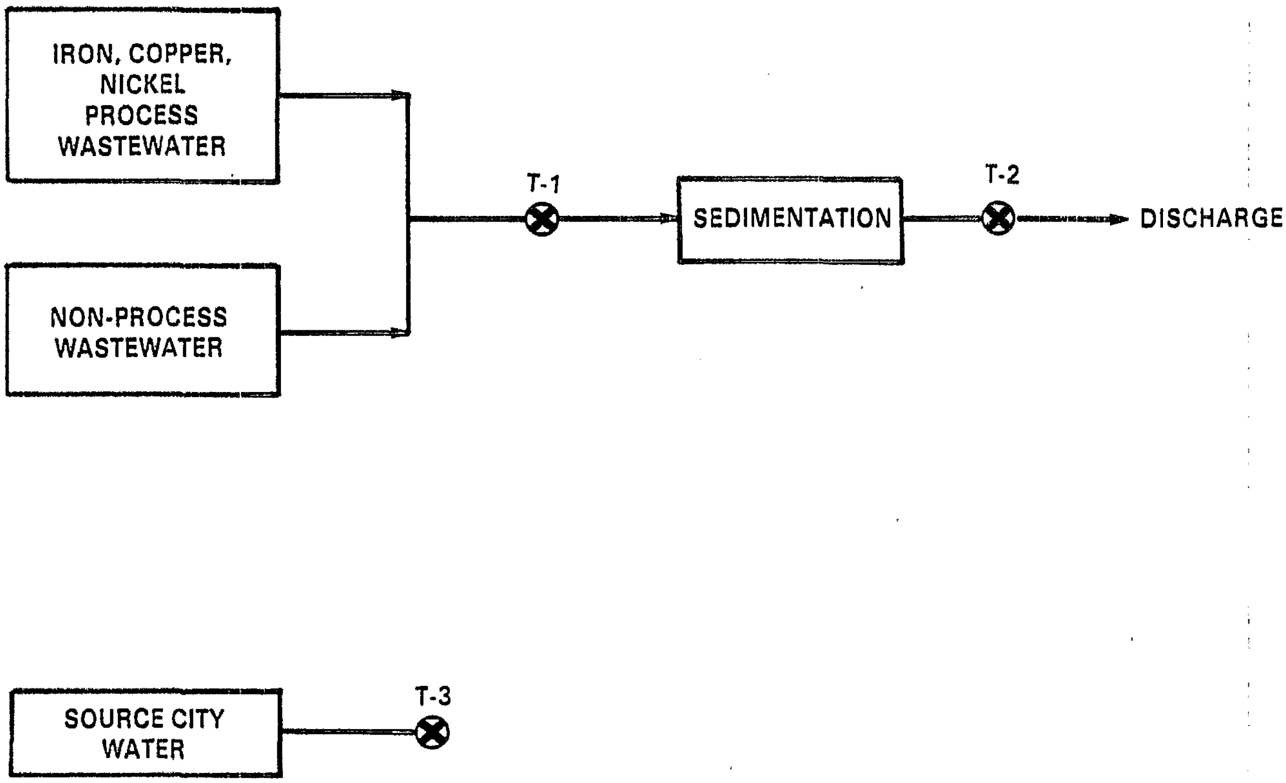


FIGURE V-19

WASTEWATER SOURCES AT PLANT T

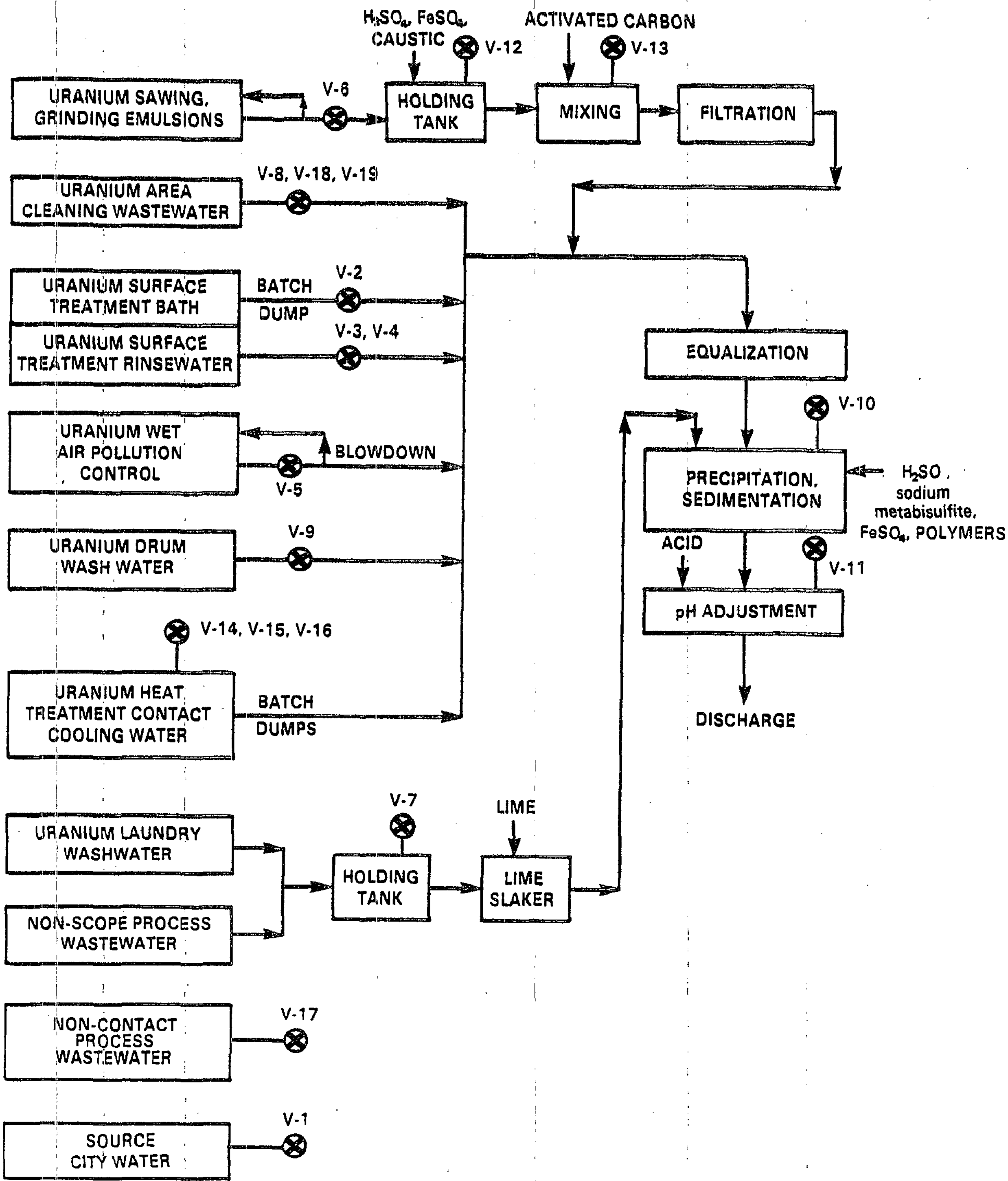


FIGURE V-21

WASTEWATER SOURCES AT PLANT V

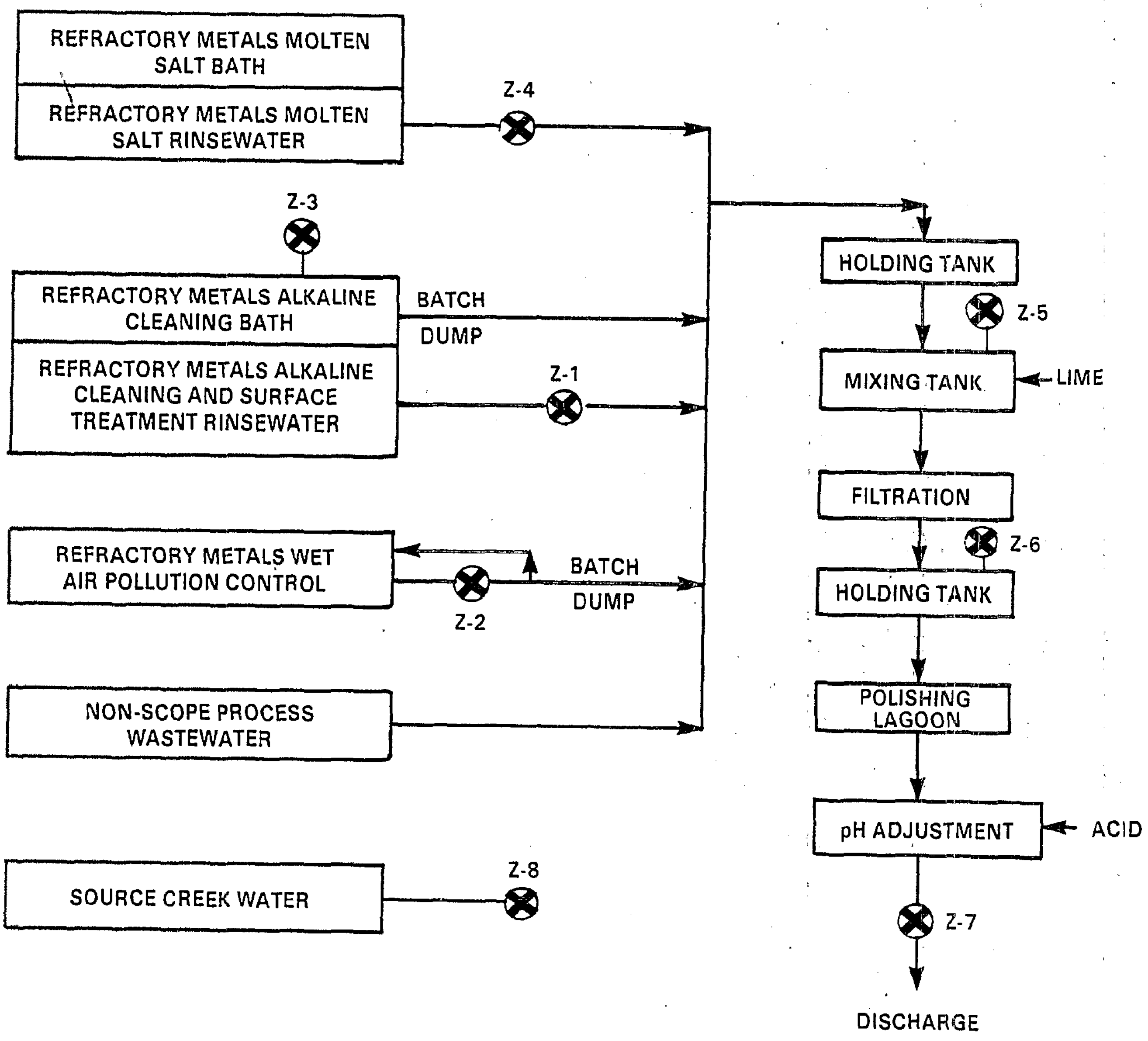


FIGURE V-25

WASTEWATER SOURCES AT PLANT Z

SECTION VI

SELECTION OF POLLUTANT PARAMETERS

The Agency has studied nonferrous metals forming wastewaters to determine the presence or absence of priority, conventional, and selected nonconventional pollutants. The priority and nonconventional pollutants are subject to BPT and BAT effluent limitations, as well as NSPS, PSES, and PSNS. The conventional pollutants are subject to BPT and BCT effluent limitations, as well as NSPS.

One hundred and twenty-nine pollutants (known as the 129 priority pollutants) were studied pursuant to the requirements of the Clean Water Act of 1977 (CWA). These pollutant parameters, which are listed in Table VI-1, are members of the 65 pollutants and classes of toxic pollutants referred to as Table 1 in Section 307(a)(1) of the CWA.

From the original list of 129 pollutants, three pollutants have been deleted in two separate amendments to 40 CFR Subchapter N, Part 401. Dichlorodifluoromethane and trichlorofluoromethane were deleted first (46 FR 2266, January 8, 1981) followed by the deletion of bis-(chloromethyl) ether (46 FR 10723, February 4, 1981).

Past studies by EPA and others have identified many nonpriority, nonconventional pollutant parameters useful in characterizing industrial wastewaters and in evaluating treatment process removal efficiencies. Certain of these and other parameters may also be selected as reliable indicators of the presence of specific priority pollutants. For these reasons, a number of nonpriority pollutants were also studied for the nonferrous metals forming category.

The conventional pollutants considered (total suspended solids, oil and grease, and pH) traditionally have been studied to characterize industrial wastewaters These parameters are especially useful in evaluating the effectiveness of wastewater treatment processes.

Several nonconventional, nonpriority pollutants were considered. As discussed in Section V, raw wastewater samples were analyzed for the following: acidity, alkalinity, aluminum, ammonia nitrogen, barium, boron, calcium, chemical oxygen demand (COD), chloride, cobalt, columbium, fluoride, gold, iron, magnesium, manganese, molybdenum, nitrate, phenolics, phosphate, phosphorus, sodium, sulfate, tantalum, tin, titanium, total dissolved solids (TDS), total organic carbon (TOC), total solids (TS), tungsten, uranium, vanadium, yttrium, zirconium, radium-226, gross-alpha, and gross-beta. Of these nonconventional pollutants, ammmonia, fluoride, gold, and molybdenum were considered for limitation in particular subcategories, since they are found in significant concentrations in some nonferrous metals forming process wastewater streams and are not effectively controlled simply by controlling the priority metal pollutants.

RATIONALE FOR SELECTION OF POLLUTANT PARAMETERS

Exclusion of Toxic Pollutants

The Settlement Agreement in Natural Resources Defense Council, Inc. vs. Train, 8 ERC 2120 (D.D.C. 1976), modified 12 ERC 1833 (D.D.C. 1979), modified by orders of October 26, 1982, August 2, 1983, January 6, 1984, July 5, 1984 and January 7, 1985, which preceded the Clean Water Act, contains provisions authorizing the exclusion from regulation in certain instances of particular pollutants, categories, and subcategories.

Paragraph 8(a)(iii) of the Settlement Agreement allows the Administrator to exclude from regulation priority pollutants not detectable by Section 304(h) analytical methods or other state-of-the-art methods. Accordingly, pollutants that were never detected, or that were never found above their analytical quantification level, are excluded from regulation. The analytical quantification level for a pollutant is the minimum concentration at which that pollutant can be reliably measured. For the priority pollutants in this study, the analytical quantification levels are: 0.005 mg/l for pesticides, PCB's, and beryllium; 0.010 mg/l for antimony, arsenic, selenium, silver, thallium, and the remaining organic priority pollutants; 0.020 mg/l for cadmium, chromium, cyanide, and zinc; 0.050 mg/l for copper, lead, and nickel; and 0.0002 mg/l for mercury.

Since there was no reason to expect TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin) in nonferrous metals forming process water, EPA decided that maintenance of a TCDD standard in analytical laboratories was too hazardous. Consequently, TCDD was analyzed by GC/MS screening, and compared to EPA's GC/MS computer file. Samples collected by the Agency's contractor were not analyzed for asbestos. Asbestos is not expected to be a part of nonferrous metals forming wastewater since the category only includes metals that have already been refined from any ores that might contain asbestos. In addition, asbestos is not known to be present in any process chemicals used in any forming operations.

Paragraph 8(a)(iii) also allows the Administrator to exclude from regulation priority pollutants detected in amounts too small to be effectively reduced by technologies known to the Administrator. Pollutants which were detected below levels considered to be achievable by specific available treatment methods are excluded. For the priority metals, the chemical precipitation, sedimentation, and filtration technology treatment effectiveness values, which are presented in Section VII were used. For the priority organic pollutants detected above their analytical quantification level, treatment effectiveness values for activated carbon technology were used. These treatment effectiveness values represent the most stringent treatment options considered for pollutant removal. This allows for the most conservative exclusion for pollutants detected below treatable levels.

Treatment effectiveness concentrations and analytical quantification concentrations are presented for the 129 priority pollutants in Table VI-2.

Paragraph 8(a)(iii) allows for the exclusion of a priority pollutant if it is detected in the source water of the samples taken.

In addition to the provisions outlined above, Paragraph 8(a)(iii) of the Settlement Agreement (1) allows the Administrator to exclude from regulation priority pollutants detectable in the effluent from only a small number of sources within the subcategory because they are uniquely related to those sources, and (2) allows the Administrator to exclude from regulation priority pollutants which will be effectively controlled by the technologies upon which are based other effluent limitations guidelines, or by pretreatment standards.

Waste streams in the nonferrous metals forming category have been grouped together by the subcategorization scheme described in Section IV. The pollutant exclusion procedure was applied for each of the following subcategories:

(1) Lead-Tin-Bismuth Forming
(2) Magnesium Forming
(3) Nickel-Cobalt Forming
(4) Precious Metals Forming
(5) Refractory Metals Forming
(6) Titanium Forming
(7) Uranium Forming
(8) Zinc Forming
(9) Zirconium-Hafnium Forming
(10) Metal Powders

Priority pollutants remaining after the application of the above exclusion process were selected for further consideration in establishing specific regulations.

DESCRIPTION OF POLLUTANT PARAMETERS

The following discussion addresses pollutant parameters detected above their analytical quantification level in any sample of nonferrous metals forming wastewater. The description of each pollutant provides the following information: the source of the pollutant; whether it is a naturally occuring element, processed metal, or manufactured compound; general physical properties and the form of the pollutant; toxic effects of the pollutant in humans and other animals; and behavior of the pollutant in a POTW at concentrations that might be expected from industrial discharges.

Acenaphthene (1). Acenaphthene (1,2-dihydroacenaphthylene, or 1,8-ethylene-naphthalene) is a polynuclear aromatic hydrocarbon (PAH) with molecular weight of 154 and a formula of $C_{12}H_{10}$.

Acenaphthene occurs in coal tar produced during high temperature coking of coal. It has been detected in cigarette smoke and gasoline exhaust condensates.

The pure compound is a white crystalline solid at room temperature with a melting range of 95C to 97C and a boiling range of 278C to 280C. Its vapor pressure at room temperature is less than 0.02 mm Hg. Acenaphthene is slightly soluble in water (100 mg/l), but even more soluble in organic solvents such as ethanol, toluene, and chloroform. Acenaphthene can be oxidized by oxygen or ozone in the presence of certain catalysts. It is stable under laboratory conditions.

Acenaphthene is used as a dye intermediate, in the manufacture of some plastics, and as an insecticide and fungicide.

So little research has been performed on acenaphthene that its mammalian and human health effects are virtually unknown. The water quality criterion of 0.02 mg/l is recommended to prevent the adverse effects on humans due to the organoleptic properties of acenaphthene in water.

No detailed study of acenaphthene behavior in a POTW is available. However, it has been demonstratd that none of the organic toxic pollutants studied so far can be broken down by biological treatment processes as readily as fatty acids, carbohydrates, or proteins. Many of the toxic pollutants have been investigated, at least in laboratory-scale studies, at concentrations higher than those expected to be contained by most municipal wastewaters. General observations relating molecular structure to ease of degradation have been developed for all of the toxic organic pollutants.

The conclusion reached by study of the limited data is that biological treatment produces little or no degradation of acenaphthene. No evidence is available for drawing conclusions about its possible toxic or inhibitory effect on POTW operation.

Its water solubility would allow acenaphthene present in the influent to pass through a POTW into the effluent. The hydrocarbon character of this compound makes it sufficiently hydrophobic that adsorption onto suspended solids and retention in the sludge may also be a significant route for removal of acenaphthene from the POTW.

Acenaphthene has been demonstrated to affect the growth of plants through improper nuclear division and polyploidal chromosome number. However, it is not expected that land application of sewage sludge containing acenaphthene at the low concentrations which are to be expectd in a POTW sludge would result in any adverse effects on animals ingesting plants grown in such soil.

Acrolein (2). The available data for acrolein indicate that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 0.068 and 0.021 mg/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested.

For the protection of human health from the toxic properties of acrolein ingested through contaminated aquatic organisms, the ambient water criterion is determined to be 0.320 mg/l. For the protection of human health from the toxic properties of acrolein ingested though contaminated aquatic organisms alone, the ambi ent water criterion is determined to be 0.780 mg/l.

Acrolein has a wide variety of applications. It is used directly as a biocide for aquatic weed control; for algae, weed, and mollusk control in recirculating process water systems; for slime control in the paper industry; and to protect liquid fuels against microorganisms. Acrolein is also used directly for crosslinking protein collagen in leather tanning and for tissue fixation in histological samples. It is widely used as an intermediate in the chemical industry. Its dimer, which is prepared by a thermal, uncatalyzed reaction, has several applications, including use as an intermediate for crosslinking agents, humectants, plasticizers, polyurethane intermediates, copolymers and homopolymers, and creaseproofing cotton. The monomer is utilized in synthesis via the Diels-Alder reaction as a dienophile or a diene. Acrolein is widely used in copolymerization, but its homopolymers do not appear commercially important. The copolymers of acrolein are used in photography, for textile treatment, in the paper industry, as builders in laundry and dishwasher detergents, and as coatings for aluminum and steel panels, as well as other applications. In 1975, worldwide production was about 59 kilotons. Its largest market was for methionine manufacture. Worldwide capacity was estimated at 102 kilotons/year, of which U.S. capacity was 47.6 kilotons/year.

Acrolein (2-propenal) is a liquid with a structural formula of CH_2 = CHCHO and a molecular weight of 56.07. It melts at -86.95C, boils at 52.5 to 53.5C, and has a density of 0.8410 at 20C. The vapor pressure at 20C is 215 mm Hg, and its water solubility is 20.8 percent by weight at 20C.

A flammable liquid with a pungent odor, acrolein is an unstable compound that undergoes polymerization to the plastic solid disacryl, especially under light or in the presence of alkali or strong acid. It is the simplest member of the class of unsaturated aldehydes, and the extreme reactivity of acrolein is due to the presence of a vinyl group (H_2C=H-) and an aldehyde group on such a small molecule. Additions to the carbon-carbon double bond of acrolein are catalyzed by acids and bases. The addition of halogens to this carbon-carbon double bond proceeds readily.

Acrolein can enter the aquatic environment by its use as an aquatic herbicide, from industrial discharge, and from the chlorination of organic compounds in wastewater and drinking water treatment. It is often present in trace amounts in foods and is a component of smog, fuel combustion, wood, and possibly other fire, and cigarette smoke. An evaluation of available data indicates that, while industrial exposure to manufactured acrolein is unlikely, acrolein from nonmanufactured sources is pervasive. Acrolein exposure will occur through food ingestion and inhalation. Exposure through the water or dermal route is less likely However, analysis of municipal effluents of Dayton, Ohio showed the presence of acrolein in six of 11 samples, with concentrations ranging from 0.020 to 200 mg/l.

Benzene (4). Benzene (C_6H_6) is a clear, colorless liquid obtained mainly from petroleum feedstocks by several different processes. Some is recovered from light oil obtained from coal carbonization gases. It boils at 80C and has a vapor pressure of 100 mm Hg at 26C. It is slightly soluble in water (1.8 g/l at 25C) and it dissolves in hydrocarbon solvents. Annual U.S. production is three to four million tons.

Most of the benzene used in the U.S. goes into chemical manufacture. About half of that is converted to ethylbenzene which is used to make styrene. Some benzene is used in motor fuels.

Benzene is harmful to human health, according to numerous published studies. Most studies relate effects of inhaled benzene vapors. These effects include nausea, loss of muscle coordination, and excitement, followed by depression and coma. Death is usually the result of respiratory or cardiac failure. Two specific blood disorders are related to benzene exposure. One of these, acute myelogenous leukemia, represents a carcinogenic effect of benzene. However, most human exposure data is based on exposure in occupational settings and benzene carcinogenesis is not considered to be firmly established.

Oral administration of benzene to laboratory animals produced leukopenia, a reduction in number of leukocytes in the blood. Subcutaneous injection of benzene-oil solutions has produced suggestive, but not conclusive, evidence of benzene carcinogensis.

Benzene demonstrated teratogenic effects in laboratory animals, and mutagenic effects in humans and other animals.

For maximum protection of human health from the potential carcinogenic effects of exposure to benzene through ingestion of water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of benzene estimated to result in additional lifetime cancer risk at levels of 10^{-7}, 10^{-6}, and 10^{-5} are 0.00015 mg/l, 0.0015 mg/l, and 0.015 mg/l, respectively.

Some studies have been reported regarding the behavior of benzene in a POTW. Biochemical oxidation of benzene under laboratory conditions, at concentrations of 3 to 10 mg/l, produced 24, 27, 24, and 20 percent degradation in 5, 10, 15, and 20 days, respectively, using unacclimated seed cultures in fresh water. Degradation of 58, 67, 76, and 80 percent was produced in the same time periods using acclimated seed cultures. Other studies produced similar results. The EPA's most recent study of the behavior of toxic organics in a POTW indicates that benzene is 78 percent removed. Other reports indicate that most benzene entering a POTW is removed to the sludge and that influent concentrations of 1 g/l inhibit sludge digestion. There is no information about possible effects of benzene on crops grown in soils amended with sludge containing benzene.

Benzidine (5). Benzidine ($NH_2(C_6H_4)2NH_2$) is a grayish-yellow, white or reddish-gray crystalline powder. It melts at 127C (260F), and boils at 400C (752F). This chemical is soluble in hot water, alcohol, and ether, but only slightly soluble in water. It is derived by: (a) reducing nitrobenzene with zinc dust in an alkaline solution followed by distillation; (b) the electrolysis of nitrobenzene, followed by distillation; or, (c) the nitration of diphenyl followed by reduction of the product with zinc dust in an alkaline solution, with subsequent dis tillation. It is used in the synthesis of a variety of organic chemicals, such as stiffening agents in rubber compounding.

Available data indicate that benzidine is acutely toxic to fresh water aquatic life at concentrations as low as 2.50 mg/l and would occur at lower concentrations among species that are more sensitive than those tested. However, no data are available concerning the chronic toxicity to sensitive freshwater and salt water aquatic life.

For the maximum protection of human health from the potential carcinogenic effects due to exposure to benzidine, through the ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of this pollutant estimated to result in additional lifetime cancer risk at levels of 10^{-5}, 10^{-6}, and 10^{-7} are 0.0000012 mg/l, 0.00000012 mg/l, and 0.000000012 mg/l, respectively.

With respect to treatment in POTWs, laboratory studies have shown that benzidine is amenable to treatment via biochemical oxidation. The expected 30-day average treated effluent concentration is 0.025 mg/l.

Carbon Tetrachloride (6). Carbon tetrachloride (CCl_4), also called tetrachloromethane, is a colorless liquid produced primarily by the chlorination of hydrocarbons - particularly methane. Carbon tetrachloride boils at 77C and has a vapor pressure of 90 mm Hg at 20C. It is slightly soluble in water (0.8 g/l at 25C) and soluble in many organic solvents. Approximately one-third of a million tons is produced annually in the U.S.

Carbon tetrachloride, which was displaced by perchloroethylene as a dry cleaning agent in the 1930's, is used principally as an intermediate for production of chlorofluoromethanes for refrigerants, aerosols, and blowing agents. It is also used as a grain fumigant.

Carbon tetrachloride produces a variety of toxic effects in humans. Ingestion of relatively large quantities -- greater than five grams -- has frequently proved fatal. Symptoms are burning sensation in the mouth, esophagus, and stomach, followed by abdominal pains, nausea, diarrhea, dizziness, abnormal pulse, and coma. When death does not occur immediately, liver and kidney damage are usually found. Symptoms of chronic poisoning are not as well defined. General fatigue, headache, and anxiety have been observed, accompanied by digestive tract and kidney discomfort or pain.

Data concerning teratogenicity and mutagenicity of carbon tetrachloride are scarce and inconclusive. However, carbon tetrachloride has been demonstrated to be carcinogenic in laboratory animals. The liver was the target organ.

For maximum protection of human health from the potential carcinogenic effects of exposure to carbon tetrachloride through ingestion of water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of carbon tetrachloride estimated to result in additional lifetime cancer risk at risk levels of 10^{-7}, 10^{-6}, and 10^{-5} are 0.000026 mg/l, 0.00026 mg/l, and 0.0026 mg/l, respectively.

Many of the toxic organic pollutants have been investigated, at least in laboratory-scale studies, at concentrations higher than those expected to be found in most municipal wastewaters. General observations have been developed relating molecular structure to ease of degradation for all of the toxic organic pollutants. The conclusion reached by study of the limited data is that biological treatment produces a moderate degree of removal of carbon tetrachloride in a POTW. No information was found regarding the possible interference of carbon tetrachloride with treatment processes. The EPA's most recent study of the behavior of toxic organics in a POTW indicates that carbon tetrachloride is 50 percent removed. Based on the water solubility of carbon tetrachloride, and the vapor pressure of this compound, it is expected that some of the undegraded carbon tetrachloride will pass through to the POTW effluent and some will be volatilized in aerobic processes.

<u>1,1,1-Trichloroethane (11)</u>. 1,1,1-Trichloroethane is one of the two possible trichlorethanes. It is manufactured by hydrochlorinating vinyl chloride to 1,1-dichloroethane which is then chlorinated to the desired product. 1,1,1-Trichloroethane is a liquid at room temperature with a vapor pressure of 96 mm Hg at 20C and a boiling point of 74C. Its formula is CCl_3CH_3. It is slightly soluble in water (0.48 g/l) and is very soluble in organic solvents. U.S. annual production is greater than one-third of a million tons.

1,1,1-Trichloroethane is used as an industrial solvent and degreasing agent.

Most human toxicity data for 1,1,1-trichloroethane relates to inhalation and dermal exposure routes. Limited data are available for determining toxicity of ingested 1,1,1-trichloroethane, and those data are all for the compound itself, not solutions in water. No data are available regarding its toxicity to fish and aquatic organisms. For the protection of human health from the toxic properties of 1,1,1-trichloroethane ingested through the comsumption of water and fish, the ambient water criterion is 15.7 mg/l. The criterion is based on bioassays for possible carcinogenicity.

Biochemical oxidation of many of the toxic organic pollutants has been investigated, at least in laboratory scale studies, at concentrations higher than commonly expected in municipal waste water. General observations relating molecular structure to ease of degradation have been developed for all of these pollutants. The conclusion reached by study of these limited data is that biological treatment produces a moderate degree of degradation of 1,1,1-trichloroethane. No evidence is available for drawing conclusions about its possible toxic or inhibitory effect on POTW operation. However, for degradation to occur, a fairly constant input of the compound would be necessary.

Its water solubility would allow 1,1,1-trichloroethane, present in the influent and not biodegrada'ble, to pass through a POTW into the effluent. The Agency s most recent study of the behavior of toxic organics in a POTW indicates that 1,1,1-trichlorethane is 87 percent removed. One factor which has received some attention, but no detailed study, is the volatilization of the lower molecular weight organics from a POTW. If 1,1,1-trichloroethane is not biodegraded, it will volatilize during aeration processes in the POTW. It has been demonstrated that none of the toxic organic pollutants of this type can be broken down by biological treatment processes as readily as fatty acids, carbohydrates, or proteins.

<u>1,1-Dichloroethane (13)</u>. 1,1-Dichloroethane, also called ethylidene dichloride and ethylidene chloride, is a colorless liquid manufactured by reacting hydrogen chloride with vinyl chloride in 1,1-dichloroethane solution in the presence of a catalyst. How ever, it is reportedly not manufactured commercially in the U.S. 1,1-Dichloroethane boils at 57C and has a vapor pressure of 182 mm Hg at 20C. It is slightly soluble in water (5.5 g/l at 20C) and very soluble in organic solvents.

1,1-Dichloroethane is used as an extractant for heat-sensitive substances and as a solvent for rubber and silicone grease.

1,1-Dichloroethane is less toxic than its isomer (1,2-dichloroethane), but its use as an anesthetic has been discontinued because of marked excitation of the heart. It causes central nervous system depression in humans. There are insufficient data to derive water quality criteria for 1,1-dichloroethane.

Many of the toxic organic pollutants have been investigated, at least in laboratory scale studies, at concentrations higher than those expected to be contained by most municipal wastewaters. General observations have been developed relating molecular structure to ease of degradation for all of the toxic organic pollutants. The conclusion reached by study of the limited data is that biological treatment produces only a moderate removal of 1,1-dichloroethane in a POTW by degradation. The EPA's most recent study of the behavior of toxic organics in a POTW indicates that 1,1-dichloroethane is 76 percent removed.

The high vapor pressure of 1,1-dichloroethane is expected to result in volatilization of some of the compound from aerobic processes in a POTW. Its water solubility will result in some of the 1,1-dichloroethane which enters the POTW leaving in the effluent from the POTW.

<u>1,1,2,2-Tetrachloroethane</u> <u>(15)</u>. 1,1,2,2-Tetrachloroethane ($CHCl_2CHCl_2$) is a heavy, colorless, mobile, nonflammable, corrosive, toxic liquid. While it has a chloroform-like odor, it is more toxic than chloroform. It is soluble in alcohol or ether, but insoluble in water. It has no flash point, boils at 146.5C (296F) and has a vapor pressure of 5 mm Hg at 20.7C. It results from the interaction of acetylene and chlorine, with subsequent distillation. This chemical is used in organic synthesis, as a solvent, and for metal cleaning and degreasing.

Available freshwater data indicate that acute toxicity occurs at concentrations of 9.32 mg/l, and that chronic toxicity occurs at 4.000 mg/l. Available saltwater data indicate that acute toxicity occurs at 9.020 mg/l.

For the maximum protection of human health from the potential carcinogenic effects due to exposure to 1,1,2,2-tetrachloroethane, through contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of this pollutant estimated to result in additional lifetime cancer risk at risk levels of 10^{-5} 10^{-6} and 10^{-7} are 0.0017 mg/l, 0.00017 mg/l, and 0.000017 mg/l, respectively.

With respect to treatment in POTW, laboratory studies have shown that 1,1,2,2-tetrachloroethane is not amenable to treatment via biochemical oxidation. As this pollutant is insoluble in water, any removal of this pollutant which would occur in a POTW, would be related to physical treatment processes.

Para-chloro-meta-cresol (22). Para-chloro-meta-cresol (ClC_7H_6OH) is thought to be a 4-chloro-3-methyl-phenol (4-chloro-meta-cresol, or 2-chloro-5-hydroxy-toluene), but is also used by some authorities to refer to 6-chloro-3-methyl-phenol (6-chloro-meta-cresol, or 4-chloro-3-hydroxy-toluene), depending on whether the chlorine is considered to be para to the methyl or to the hydroxy group. It is assumed for the purposes of this document that the subject compound is 2-chloro-5-hydroxy-toluene. This compound is a colorless crystalline solid melting at 66 to 68C. It is slightly soluble in water (3.8 g/l) and soluble in organic solvents. This phenol reacts with 4-amino antipyrene to give a colored product and therefore contributes to the nonconventional pollutant parameter designated "Total Phenols." No information on manufacturing methods or volumes produced was found.

Para-chloro-meta cresol (abbreviated here as PCMC) is marketed as a microbicide, and was proposed as an antiseptic and disinfectant more than 40 years ago. It is used in glues, gums, paints, inks, textiles, and leather goods.

Although no human toxicity data are available for PCMC, studies on laboratory animals have demonstrated that this compound is toxic when administered subcutaneously and intravenously. Death was preceded by severe muscle tremors. At high dosages kidney damage occurred. On the other hand, an unspecified isomer of chlorocresol, presumed to be PCMC, is used at a concentration of 0.15 percent to preserve mucous heparin, a natural product administered intravenously as an anticoagulant. The report does not indicate the total amount of PCMC typically received. No information was found regarding possible teratogenicity, or carcinogenicity of PCMC.

Two reports indicate that PCMC undergoes degradation in biochemical oxidation treatments carried out at concentrations higher than are expected to be encountered in POTW influents. One study showed 50 percent degradation in 3.5 hours when a phenol-adapted acclimated seed culture was used with a solution of 60 mg/l PCMC. The other study showed 100 percent degradation of a 20 mg/l solution of PCMC in two weeks in an aerobic activated sludge test system. No degradation of PCMC occurred under anaerobic conditions. The EPA's most recent study of the behavior of toxic organics in a POTW indicates that PCMC is 89 percent removed.

Chloroform (23). Chloroform, also called trichloromethane, is a colorless liquid manufactured commercially by chlorination of methane. Careful control of conditions maximizes chloroform production, but other products must be separated. Chloroform boils at 61C and has a vapor pressure of 200 mm Hg at 25C. It is slightly soluble in water (8.22 g/l at 20C) and readily soluble in organic solvents.

Chloroform is used as a solvent and to manufacture refrigerants, pharmaceuticals, plastics, and anesthetics. It is seldom used as an anesthetic.

Toxic effects of chloroform on humans include central nervous system depression, gastrointestinal irritation, liver and kidney damage and possible cardiac sensitization to adrenalin. Carcinogenicity has been demonstrated for chloroform on laboratory animals.

For the maximum protection of human health from the potential carcinogenic effects of exposure to chloroform through ingestion of water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of chloroform estimated to result in additional lifetime cancer risks at the levels of 10^{-7}, 10^{-6}, and 10^{-5} were 0.000021 mg/l, 0.00021 mg/l, and 0.0021 mg/l, respectively.

The biochemical oxidation of this compound was studied in one laboratory scale study at concentrations higher than those expected to be contained by most municipal wastewaters. After 5, 10, and 20 days no degradation of chloroform was observed. The conclusion reached is that biological treatment produces little or no removal by degradation of chloroform in a POTW.

The high vapor pressure of chloroform is expected to result in volatilization of the compound from aerobic treatment steps in a POTW. Remaining chloroform is expected to pass through into the POTW effluent. In addition, the most recent EPA study of the behavior of toxic organics in a POTW indicates that chloroform is 61 percent removed.

<u>3,3'-Dichlorobenzidine (28)</u>. 3,3'-Dichlorobenzidine (DCB) or dichlorobenzidine (4,4'-diamino-3,3'-dichlorobiphenyl) is used in the production of dyes and pigments and as a curing agent for polyurethanes. The molecular formula of dichlorobenzidine is $C_{12}H_{10}Cl_2N_2$ and the molecular weight is 253.13.

DCB forms brownish needles with a melting point of 132 to 133C. It is readily soluble in alcohol, benzene, and glacial acetic acid, slightly soluble in HCl, and sparingly soluble in water (0.7 g/l at 15C). When combined with ferric chloride or bleaching powder, a green color is produced.

The affinity of DCB for suspended particulates in water is not clear; its basic nature suggests that it may be fairly tightly bound to humic materials in soils. Soils may be moderate to long term reservoirs for DCB.

Pyrolysis of DCB will most likely lead to the release of HCl. Because of the halogen substitution, DCB compounds probably biodegrade at a slower rate than benzidine alone. The photochemistry of DCB is not completely known. DCB may photodegrade to benzidine.

Assuming the clean air concentrations of ozone (2×10^{-9}) and an average atmospheric concentration of hydroxyl radicals (3×10^{-15} M), the half life for oxidation of DCB by either of these chemical compounds is on the order of one and one to 10 days, respectively. Furthermore, assuming a representative concentration of 10^{-19} M for peroxy radicals in sunlit oxygenated water, the half-life for oxidation by these compounds is approximately 100 days, given the variability of environmental conditions.

The data base available for dichlorobenzidines and freshwater organisms is limited to one test on bioconcentration of 3,3'-dichlorobenzidine. No statement can be made concerning acute or chronic toxicity of this pollutant.

No saltwater organisms have been tested with any dichlorobenzidine; no statement can be made concerning acute or chronic toxicity for that pollutant on saltwater organisms.

For the maximum protection of human health from the potential carcinogenic effects due to exposure of dichlorobenzidine through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, the levels that may result in incremental increase of cancer risk over the lifetime were estimated at 10^{-5}, 10^{-6}, and 10^{-7}. The corresponding recommended criteria are 0.000103 mg/l, 0.00001 mg/l and 0.000001 mg/l, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 0.000204 mg/l, 0.000020 mg/l, and 0.000002 mg/l, respectively.

1,1-Dichloroethylene (29). 1,1-Dichloroethylene (1,1-DCE), also called vinylidene chloride, is a clear colorless liquid manufactured by dehydrochlorination of 1,1,2-trichloroethane. 1,1-DCE has the formula CCl_2CH_2. It has a boiling point of 32C, and a vapor pressure of 591 mm Hg at 25C. 1,1-DCE is slightly soluble in water (2.5 mg/l) and is soluble in many organic solvents. U.S. production is in the range of hundreds of thousands of tons annually.

1,1-DCE is used as a chemical intermediate and for copolymer coatings or films. It may enter the wastewater of an industrial facility as the result of decomposition of 1,1,1-trichloroethylene used in degreasing operations, or by migration from vinylidene chloride copolymers exposed to the process water. Human toxicity of 1,1-DCE has not been demonstrated; however, it is a suspected human carcinogen. Mammalian toxicity studies have focused on the liver and kidney damage produced by 1,1-DCE.

Various changes occur in those organs in rats and mice ingesting 1,1-DCE.

For the maximum protection of human health from the potential carcinogenic effects of exposure to 1,1-dichloroethylene through ingestion of water and contaminated aquatic organisms, the ambient water concentration is zero. The concentration of 1,1-DCE estimated to result in an additional lifetime cancer risk of 1 in 100,000 is 0.0013 mg/l.

Under laboratory conditions, dichloroethylenes have been shown to be toxic to fish. The primary effect of acute toxicity of the dichloroethylenes is depression of the central nervous system. The octanol/water partition coefficient of 1,1-DCE indicates it should not accumulate significantly in animals.

Biochemical oxidation of many of the toxic organic pollutants has been investigated in laboratory scale studies at concentrations higher than would normally be expected in municipal wastewaters. General observations relating molecular structure to ease of degradation have been developed for all of these pollutants. The conclusion reached by study of the limited data is that biological treatment produces little or no degradation of 1,1-dichloroethylene. No evidence is available for drawing conclusions about the possible toxic or inhibitory effect of 1,1-DCE on POTW operation. Because of water solubility, 1,1-DCE which is not volatilized or degraded is expected to pass through a POTW. Very little 1,1-DCE is expected to be found in sludge from a POTW.

The most recent EPA study of the behavior of toxic organics in a POTW indicates that 1,1-DCE is 80 percent removed. The very high vapor pressure of 1,1-DCE is expected to result in release of significant percentages of this material to the atmosphere in any treatment involving aeration. Degradation of dichloroethylene in air is reported to occur, with a half-life of eight weeks.

<u>2,4-Dimethylphenol (34)</u>. 2,4-Dimethylphenol (2,4-DMP), also called 2,4-xylenol, is a colorless, crystalline solid at room temperature (25C), but melts at 27C to 28C. 2,4-DMP is slightly soluble in water and, as a weak acid, is soluble in alkaline solutions. Its vapor pressure is less than 1 mm Hg at room temperature.

2,4-DMP is a natural product, occurring in coal and petroleum sources. It is used commercially as an intermediate for manufacture of pesticides, dye stuffs, plastics and resins, and surfactants. It is found in the water runoff from asphalt surfaces. It can find its way into the wastewater of a manufacturing plant from any of several adventitious sources.

Analytical procedures specific to this compound are used for its identification and quantification in wastewaters. This compound does not contribute to "Total Phenols" determined by the 4-aminoantipyrene method.

Three methylphenol isomers (cresols) and six dimethylphenol isomers (xylenols) generally occur together in natural products, industrial processes, commercial products, and phenolic wastes. Therefore, data are not available for human exposure to 2,4-DMP alone. In addition to this, most mammalian tests for toxicity of individual dimethylphenol isomers have been conducted with isomers other than 2,4-DMP.

In general, the mixtures of phenol, methylphenols, and dimethyl phenols contain compounds which produced acute poisoning in laboratory animals. Symptoms were difficult breathing, rapid muscular spasms, disturbance of motor coordination, and asymmetrical body position. In a 1977 National Academy of Science publication the conclusion was reached that, "In view of the relative paucity of data on the mutagenicity, carcinogenicity, teratogenicity, and long term oral toxicity of 2,4-dimethylphenol, estimates of the effects of chronic oral exposure at low levels cannot be made with any confidence." No ambient water quality criterion can be set at this time. In order to protect public health, exposure to this compound should be minimized as soon as possible.

Toxicity data for fish and freshwater aquatic life are limited; however, in reported studies of 2,4-dimethylphenol at concentrations as high as 2 mg/l no adverse effects were observed.

Biological degradability of 2,4-DMP as determined in one study, showed 94.5 percent removal based on chemical oxygen demand (COD). Another study determined that persistance of 2,4-DMP in the environment is low, and thus any of the compound which remained in the sludge or passed through the POTW into the effluent would be degraded within moderate length of time (estimated as two months in the report). The EPA's most recent study of the behavior of toxic organics in a POTW indicates that 2,4-DMP is 59 percent removed.

As a weak acid, the behavior of 2,4-DMP may be somewhat dependent on the pH of the influent to the POTW. However, over the normal limited range of POTW pH, little effect of pH would be expected.

<u>2,4-Dinitrotoluene (35)</u>. 2,4-Dinitrotoluene $[(NO_2)_2 C_6H_4CH_3]$, a yellow crystalline compound, is manufactured as a coproduct with the 2,6-isomer by nitration of nitrotoluene. It melts at 71C. 2,4-Dinitrotoluene is insoluble in water (0.27 g/l at 22C) and soluble in a number of organic solvents. Production data for the 2,4-isomer alone are not available. The 2,4-and 2,6-isomers are manufactured in an 80:20 or 65:35 ratio, depending on the process used. Annual U.S. commercial production is about 150 thousand tons of the two isomers. Unspecified amounts are produced by the U.S. government and further nitrated to trinitrotoluene (TNT) for military use. The major use of the dinitrotoluene mixture is for production of toluene diisocyanate used to make polyurethanes. Another use is in production of dyestuffs.

The toxic effect of 2,4-dinitrotoluene in humans is primarily methemoglobinemia (a blood condition hindering oxygen transport by the blood). Symptoms depend on severity of the disease, but include cyanosis, dizziness, pain in joints, headache, and loss of appetite in workers inhaling the compound. Laboratory animals fed oral doses of 2,4-dinitrotoluene exhibited many of the same symptoms. Aside from the effects in red blood cells, effects are observed in the nervous system and testes.

Chronic exposure to 2,4-dinitrotoluene may produce liver damage and reversible anemia. No data were found on teratogenicity of this compound. Mutagenic data are limited and are regarded as confusing. Data resulting from studies of carcinogenicity of 2,4-dinitrotoluene point to a need for further testing for this property.

For the maximum protection of human health from the potential carcinogenic effects of exposure to 2,4-dinitrotoluene through ingestion of water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of 2,4-dinitrotoluene estimated to result in additional lifetime cancer risk at risk levels of 10^{-7} 10^{-6} and 10^{-5} are 0.0074 mg/l, 0.074 mg/l, and 0.740 mg/l, respectively.

Data on the behavior of 2,4-dinitrotoluene in a POTW are not available. However, biochemical oxidation of 2,4-dinitrophenol was investigated on a laboratory scale. At 100 mg/l of 2,4-dinitrotoluene, a concentration considerably higher than that expected in municipal wastewaters, biochemical oxidation by an acclimated, phenol-adapted seed culture produced 52 percent degradation in three hours. Based on this limited information and general observations relating molecular structure to ease of degradation for all the toxic organic pollutants, it was concluded that biological treatment in a POTW removes 2,4-dinitrotoluene to a high degree or completely. No information is available regarding possible interference by 2,4-dinitrotoluene in POTW treatment processes, or on the possible detrimental effect on sludge used to amend soils in which food crops are grown.

2,6-Dinitrotoluene (36). 2,6-Dinitrotoluene $[(NO_2)_2 C_6H_4CH_3]$, a yellow crystalline compound, is manufactured as a coproduct with the 2,4-isomer by nitration of nitrotoluene. It melts at 71C. 2,6-Dinitrotoluene is insoluble in water (0.27 g/l at 22C) and soluble in a number of organic solvents. Production data for the 2,6-isomer alone are not available. The 2,4- and 2,6-isomers are manufactured in an 80:20 or 65:35 ratio, depending on the process used. Annual U.S. commercial production is about 150 thousand tons of the two isomers. Unspecified amounts are produced by the U.S. government and further nitrated to trinitrotoluene (TNT) for military use. The major use of the dinitrotoluene mixture is for production of toluene diisocyanate used to make polyurethanes. Another use is in production of dyestuffs.

Data on the behavior of 2,6-dinitrotoluene in a POTW are not available. However, biochemical oxidation of the 2,4-dinitrotoluene isomer was investigated in a laboratory scale. At 100 mg/l of 2,4-dinitrotoluene, a concentration considerably higher than that expected in municipal wastewaters, biochemical oxidation by an acclimated, phenol-adapted seed culture produced 52 percent degradation in three hours. Based on this limited information and general observations relating molecular structure to ease of degradation for all the toxic organic pollutants, it was concluded that biological treatment in a POTW removes 2,4-dinitrotoluene to a high degree. It is not known if ths conclusion can be expanded to include the 2,6-isomer. No information is available regarding possible interference by 2,6-dinitrotoluene in POTW treatment processes, or on the possible detrimental effect on sludge used to amend soils in which food crops are grown.

<u>Ethylbenzene (38)</u>. Ethylbenzene is a colorless, flammable liquid manufactured commercially from benzene and ethylene. Approximately half of the benzene used in the U.S. goes into the manufacture of more than three million tons of ethylbenzene annually. Ethylbenzene boils at 136C and has a vapor pressure of 7 mm Hg at 20C. It is slightly soluble in water (0.14 g/l at 15C) and is very soluble in organic solvents.

About 98 percent of the ethylbenzene produced in the U.S. goes into the production of styrene, much of which is used in the plastics and synthetic rubber industries. Ethylbenzene is a constituent of xylene mixtures used as diluents in the paint industry, agricultural insecticide sprays, and gasoline blends.

Although humans are exposed to ethylbenzene from a variety of sources in the environment, little information on effects of ethylbenzene in man or animals is available. Inhalation can irritate eyes, affect the respiratory tract, or cause vertigo. In laboratory animals ethylbenzene exhibited low toxicity. There are no data available on teratogenicity, mutagenicity, or carcinogenicity of ethylbenzene.

Criteria are based on data derived from inhalation exposure limits. For the protection of human health from the toxic properties of ethylbenzene ingested through water and contaminated aquatic organisms, the ambient water quality criterion is 1.1 mg/l.

Laboratory scale studies of the biochemical oxidation of ethylbenzene at concentrations greater than would normally be found in municipal wastewaters have demonstrated varying degrees of degradation. In one study with phenol-acclimated seed cultures, 27 percent degradation was observed in a half day at 250 mg/l ethylbenzene. Another study at unspecified conditions showed 32, 38, and 45 percent degradation after 5, 10, and 20 days, respectively. Based on these results and general observations relating molecular structure of degradation, the conclusion was reached that biological treatment produces only moderate removal of ethylbenzene in a POTW by degradation.

Other studies suggest that most of the ethybenzene entering a POTW is removed from the aqueous stream to the sludge. The ethylbenzene contained in the sludge removed from the POTW may volatilize.

In addition, the most recent EPA study of the behavior of toxic organics in POTW indicates that ethylbenzene is approximately 84 percent removed.

Fluoranthene (39). Fluoranthene (1,2-benzacenaphthene) is one of the compounds called polynuclear aromatic hydrocarbons (PAH). A pale yellow solid at room temperature, it melts at 111C and has a negligible vapor pressure at 25C. Water solubility is low (0.2 mg/l). Its molecular formula is $C_{16}H_{10}$.

Fluoranthene, along with many other PAH's, is found throughout the environment. It is produced by pyrolytic processing of organic raw materials, such as coal and petroleum, at high temperature (coking processes). It occurs naturally as a product of plant biosyntheses. Cigarette smoke contains fluoranthene. Although it is not used as the pure compound in industry, it has been found at relatively higher concentrations (0.002 mg/l) than most other PAH's in at least one industrial effluent. Further more, in a 1977 EPA survey to determine levels of PAH in U.S. drinking water supplies, none of the 110 samples analyzed showed any PAH other than fluoranthene.

Experiments with laboratory animals indicate that fluoranthene presents a relatively low degree of toxic potential from acute exposure, including oral administration. Where death occurred, no information was reported concerning target organs or specific cause of death.

There is no epidemiological evidence to prove that PAH in general, and fluoranthene, in particular, present in drinking water are related to the development of cancer. The only studies directed toward determining carcinogenicity of fluoranthene have been skin tests on laboratory animals. Results of these tests show that fluoranthene has no activity as a complete carcinogen (i.e., an agent which produces cancer when applied by itself), but exhibits significant cocarcinogenicity (i.e., in combination with a carcinogen, it increases the carcinogenic activity).

Based on the limited animal study data, and following an established procedure, the ambient water quality criterion for fluoranthene alone (not in combination with other PAH) is determined to be 200 mg/l for the protection of human health from its toxic properties.

There are no data on the chronic effects of fluoranthene on freshwater organisms. One saltwater invertebrate shows chronic toxicity at concentrations below 0.016 mg/l. For some fresh water fish species the concentrations producing acute toxicity are substantially higher, but data are very limited.

Results of studies of the behavior of fluoranthene in conventional sewage treatment processes found in a POTW have been published. Removal of fluoranthene during primary sedimentation was found to be 62 to 66 percent (from an initial value of 0.00323 to 0.04435 mg/l to a final value of 0.00122 to 0.0146 mg/l), and the removal was 91 to 99 percent (final values of 0.00028 to 0.00026 mg/l) after biological purification with activated sludge processes.

A review was made of data on biochemical oxidation of many of the toxic organic pollutants investigated in laboratory scale studies at concentrations higher than would normally be expected in municipal wastewaters. General observations relating molecular structure to ease of degradation have been developed for all of these pollutants. The conclusion reached by study of the limited data is that biological treatment produces little or no degradation of fluoranthene. The same study, however, concludes that fluoranthene would be readily removed by filtration and oil-water separation and other methods which rely on water insolubility, or adsorption on other particulate surfaces. This latter conclusion is supported by the previously cited study showing significant removal by primary sedimentation.

No studies were found to give data on either the possible interference of fluoranthene with POTW operation, or the persistance of fluoranthene in sludges or POTW effluent waters. Several studies have documented the ubiquity of fluoranthene in the environment and it cannot be readily determined if this results from persistence of anthropogenic fluoranthene or the replacement of degraded fluoranthene by natural processes such as biosynthesis in plants.

Methylene Chloride (44). Methylene chloride, also called dichloromethane (CH_2Cl_2), is a colorless liquid manufactured by chlorination of methane or methyl chloride followed by separation from the higher chlorinated methanes formed as coproducts. Methylene chloride boils at 40C, and has a vapor pressure of 362 mm Hg at 20C. It is slightly soluble in water (20 g/l at 20C), and very soluble in organic solvents. U.S. annual production is about 250,000 tons.

Methylene chloride is a common industrial solvent found in insecticides, metal cleaners, paint, and paint and varnish removers.

Methylene chloride is not generally regarded as highly toxic to humans. Most human toxicity data are for exposure by inhalation. Inhaled methylene chloride acts as a central nervous system depressant. There is also evidence that the compound causes heart failure when large amounts are inhaled.

Methylene chloride does produce mutation in tests for this effect. In addition, a bioassay recognized for its extremely high sensitivity to strong and weak carcinogens produced results which were marginally significant. Thus potential carcinogenic effects of methylene chloride are not confirmed or denied, but are under continuous study. These studies are difficult to conduct for two reasons. First, the low boiling point (40C) of methylene chloride makes it difficult to maintain the compound at 37C during incubation. Secondly, all impurities must be removed because the impurities themselves may be carcinogenic. These complications also make the test results difficult to interpret.

For the protection of human health from the toxic properties of methylene chloride ingested through water and contaminated aquatic organisms, the ambient water criterion is 0.002 mg/l. The biochemical oxidation of this compound was studied in one laboratory scale study at concentrations higher than those expected to be contained by most municipal wastewaters. After five days no degradation of methylene chloride was observed. The conclusion reached is that biological treatment produces little or no removal by degradation of methylene chloride in a POTW.

The high vapor pressure of methylene chloride is expected to result in volatilization of the compound from aerobic treatment steps in a POTW. It has been reported that methylene chloride inhibits anaerobic processes in a POTW. Methylene chloride that is not volatilized in the POTW is expected to pass through into the effluent.

The most recent EPA study of POTW removal of toxic organics indicates that methylene chloride is approximately 58 percent removed.

<u>Methyl Chloride (45)</u>. Methyl chloride (CH_3Cl) is a colorless, noncorrosive liquifiable gas which is transparent in both the gaseous and liquid states. It has a faintly sweet, ethereal odor. It boils at -23.7C (-11F). It is slightly soluble in water (by which it is decomposed) and soluble in alcohol, chloroform, benzene, carbon tetrachloride, and glacial acetic acid. It is derived by: (a) the chlorination of methane; and, (b) the action of hydrochloric acid on methanol, either in vapor or liquid phase. It is used as an extractant and solvent, as a pesticide, in the synthesis of organic chemicals, and in silicones.

The available data for this pollutant indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 11.0 mg/l. No data are available concerning this pollutant's chronic toxicity to sensitive freshwater aquatic life. The available data for this pollutant indicate that acute and chronic toxicities to saltwater aquatic life occur at concentrations as low as 12.0 mg/l and 6.40 mg/l, respectively. With respect to saltwater aquatic life, a decrease in algal cell numbers was found to occur at concentrations as low as 11.5 mg/l.

For the maximum protection of human health from the potential carcinogenic effects due to exposure to this pollutant, through the ingestion of contaminated water and aquatic organisms, the ambient water concentration should be zero. Concentrations of in additional lifetime cancer this pollutant estimated to result, risks at risk levels of 10^{-5} 10^{-6} and 10^{-7} are 0.0019 mg/l, 0.00019 mg/l, and 0.000019 mg/l, respectively.

Concerning treatment in POTW, laboratory studies have shown that methyl chloride is not amenable to treatment via biochemical oxidation.

Chlorodibromomethane (51). Chlorodibromomethane ($CHBr_2Cl$) is a clear, colorless, heavy liquid. It boils at 116C (241F). This pollutant is used in the synthesis of various organic compounds.

The available data for this pollutant indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 11.0 mg/l. No data are available concerning this pollutant's chronic toxicity to sensitive freshwater aquatic life. The available data for this pollutant indicate that acute and chronic toxicities to saltwater aquatic life occur at concentrations as low as 12.0 mg/l and 6.40 mg/l, respectively. With respect to saltwater aquatic life, a decrease in algal cell numbers was found to occur at concentrations as low as 11.5 mg/l.

For the maximum protection of human health from the potential carcinogenic effects due to exposure to this pollutant, through the ingestion of contaminated water and aquatic organisms, the ambient water concentration should be zero. Concentrations of this pollutant estimated to result in additional lifetime cancer risks at risk levels of 10^{-5}, 10^{-6}, and 10^{-7} are 0.0019 mg/l, 0.00019 mg/l, and 0.000019 mg/l, respectively.

With respect to treatment in POTW, laboratory studies indicate that this pollutant is not amenable to treatment via biochemical oxidation.

Naphthalene (55). Naphthalene is an aromatic hydrocarbon with two orthocondensed benzene rings and a molecular formula of $C_{10}H_8$. As such it is properly classed as a polynuclear aromatic hydrocarbon (PAH). Pure naphthalene is a white crystalline solid melting at 80C. For a solid, it has a relatively high vapor pressure (0.05 mm Hg at 20C), and moderate water solubility (19 mg/l at 20C). Napthalene is the most abundant single component of coal tar. Production is more than a third of a million tons annually in the U.S. About three fourths of the production is used as feedstock for phthalic anhydride manufacture. Most of the remaining production goes into manufacture of insecticide, dyestuffs, pigments, and pharmaceuticals. Chlorinated and partially hydrogenated naphthalenes are used in some solvent mixtures. Naphthalene is also used as a moth repellent.

Naphthalene, ingested by humans, has reportedly caused vision loss (cataracts), hemolytic anemia, and occasionally, renal disease. These effects of naphthalene ingestion are confirmed by studies on laboratory animals. No carcinogenicity studies are available which can be used to demonstrate carcinogenic activity for naphthalene. Naphthalene does bioconcentrate in aquatic organisms.

For the protection of human health from the toxic properties of naphthalene ingested through water and through contaminated aquatic organisms, the ambient water criterion is determined to be 143 mg/l.

Only a limited number of studies have been conducted to determine the effects of naphthalene on aquatic organisms. The data from those studies show only moderate toxicity.

Biochemical oxidation of many of the toxic organic pollutants has been investigated in laboratory scale studies at concentrations higher than would normally be expected in municipal wastewaters. General observations relating molecular structure to ease of degradation have been developed for all of these pollutants. The conclusion reached by study of the limited data is that biological treatment produces a high removal by degradation of naphthalene. One recent study has shown that microorganisms can degrade naphthalene, first to a dihydro compound, and ultimately to carbon dioxide and water.

Naphthalene has been detected in sewage plant effluents at concentrations up to 0.022 mg/l in studies carried out by the U.S. EPA. Influent levels were not reported. The most recent EPA study of the behavior of toxic organics in POTW indicates that naphthalene is approximately 61 percent removed.

<u>Nitrobenzene (56)</u>. Nitrobenzene ($C_6H_5NO_2$), also called nitrobenzol and oil of mirbane, is a pale yellow, oily liquid, manufactured by reacting benzene with nitric acid and sulfuric acid. Nitrobenzene boils at 210C and has a vapor pressure of 0.34 mm Hg at 25C. It is slightly soluble in water (1.9 g/l at 20C), and is miscible with most organic solvents. Estimates of annual U.S. production vary widely, ranging from 100 to 350 thousand tons.

Almost the entire volume of nitrobenzene produced (97 percent) is converted to aniline, which is used in dyes, rubber, and medicinals. Other uses for nitrobenzene include: solvent for organic synthesis, metal polishes, shoe polish, and perfume.

The toxic effects of ingested or inhaled nitrobenzene in humans are related to its action in blood: methemoglobinemia and cyanosis. Nitrobenzene administered orally to laboratory animals caused degeneration of heart, kidney, and liver tissue; paralysis; and death. Nitrobenzene has also exhibited teratogenicity in laboratory animals, but studies conducted to determine mutagenicity or carcinogenicity did not reveal either of these properties.

For the prevention of adverse effects due to the organoleptic properties of nitrobenzene in water, the criterion is 0.030 mg/l.

Data on the behavior of nitrobenzene in POTW are not available. However, laboratory scale studies have been conducted at concentrations higher than those expected to be found in municipal wastewaters. Biochemical oxidation produced no degradation after 5, 10, and 20 days. A second study also reported no degradation after 28 hours, using an acclimated, phenol-adapted seed culture with nitrobenzene at 100 mg/l. Based on these limited data, and on general observations relating molecular structure to ease of biological oxidation, it is concluded that little or no removal of nitrobenzene occurs during biological treatment in POTW. The low water solubility and low vapor pressure of nitrobenzene lead to the expectation that nitrobenzene will be removed from POTW in the effluent and by volatilization during aerobic treatment.

2-Nitrophenol (57). 2-Nitrophenol ($NO_2C_6H_4OH$), also called ortho-nitrophenol, is a light yellow crystalline solid, manufactured commercially by hydrolysis of 2-chloro-nitrobenzene with aqueous sodium hydroxide. 2-Nitrophenol melts at 45C and has a vapor pressure of 1 mm Hg at 49C. 2-Nitrophenol is slightly soluble in water (2.1 g/l at 20C) and soluble in organic solvents. This phenol does not react to give a color with 4-aminoantipyrene, and therefore does not contribute to the nonconventional pollutant parameter "Total Phenols." U.S. annual production is 5,000 to 8,000 tons.

The principal use of ortho-nitrophenol is to synthesize ortho-aminophenol, ortho-nitroanisole, and other dyestuff intermediates.

The toxic effects of 2-nitrophenol on humans have not been extensively studied. Data from experiments with laboratory animals indicate that exposure to this compound causes kidney and liver damage. Other studies indicate that the compound acts directly on cell membranes, and inhibits certain enzyme systems in vitro. No information regarding potential teratogencity was found. Available data indicate that this compound does not pose a mutagenic hazard to humans. Very limited data for 2-nitrophenol do not reveal potential carcinogenic effects.

The available data base is insufficient to establish an ambient water criterion for protection of human health from exposure to 2-nitrophenol. No data are available on which to evaluate the adverse effects of 2-nitrophenol on aquatic life.

Data on the behavior of 2-nitrophenol in POTW were not available. However, laboratory-scale studies have been conducted at concentrations higher than those expected to be found in municipal wastewater. Biochemical oxidation using adapted cultures from various sources produced 95 percent degradation in three to six days in one study. Similar results were reported for other studies. Based on these data, and general observations relating molecular structure to ease of biological oxidation, it is expected that 2-nitrophenol will be biochemically oxidized to a lesser extent than domestic sewage by biological treatment in POTW.

4-Nitrophenol (58) 4-Nitrophenol ($NO_2C_6H_4OH$), also called paranitrophenol, is a colorless to yellowish crystalline solid manufactured commercially by hydrolysis of 4-chloronitrobenzene with aqueous sodium hydroxide. 4-Nitrophenol melts at 114C. Vapor pressure is not cited in the usual sources. 4-Nitrophenol is slightly soluble in water (15 g/l at 25C) and soluble in organic solvents. This phenol does not react to give a color with 4-aminoantipyrene, and therefore does not contribute to the nonconventional pollutant parameter "Total Phenols." U.S. annual production is about 20,000 tons.

Paranitrophenol is used to prepare phenetidine, acetaphenetidine, azo and sulfur dyes, photochemicals, and pesticides.

The toxic effects of 4-nitrophenol on humans have not been extensively studied. Data from experiments with laboratory animals indicate that exposure to this compound results in methemoglobinemia, shortness of breath, and stimulation followed by depression. Other studies indicate that the compound acts directly on cell membranes, and inhibits certain enzyme systems in vitro. No information regarding potential teratogenicity was found. Available data indicate that this compound does not pose a mutagenic hazard to humans. Very limited data for 4-nitrophenol do not reveal potential carcinogenic effects, although the compound has been selected by the national cancer institute for testing under the Carcinogenic Bioassay Program.

No U.S. standards for exposure to 4-nitrophenol in ambient water have been established.

Data on the behavior of 4-nitrophenol in a POTW are not available. However, laboratory scale studies have been conducted at concentrations higher than those expected to be found in municipal wastewaters. Biochemical oxidation using adapted cultures from various sources produced 95 percent degradation in three to six days in one study. Similar results were reported for other studies. Based on these data, and on general observations relating molecular structure to ease of biological oxidation, it is concluded that complete or nearly complete removal of 4-nitrophenol occurs during biological treatment in a POTW.

4,6-Dinitro-o-cresol (60). 4,6-Dinitro-o-cresol (DNOC) is a yellow crystalline solid derived from o-cresol. DNOC melts at 85.8C and has a vapor pressure of 0.000052 mm Hg at 20C. DNOC is sparingly soluble in water (100 mg/l at 20C), while it is readily soluble in alkaline aqueous solutions, ether, acetone, and alcohol. DNOC is produced by sulfonation of o-cresol followed by treatment with nitric acid.

DNOC is used primarily as a blossom thinning agent on fruit trees and as a fungicide, insecticide, and miticide on fruit trees during the dormant season. It is highly toxic to plants in the growing stage. DNOC is not manufactured in the U.S. as an agricultural chemical. Imports have been decreasing recently with only 30,000 lbs being imported in 1976.

While DNOC is highly toxic to plants, it is also very toxic to humans and is considered to be one of the more dangerous agricultural pesticides. The available literature concerning humans indicates that DNOC may be absorbed in acutely toxic amounts through the respiratory and gastrointestinal tracts and through the skin, and that it accumulates in the blood. Symptoms of poisoning include profuse sweating, thirst, loss of weight, headache, malaise, and yellow staining to the skin, hair, sclera, and conjunctiva.

There is no evidence to suggest that DNOC is teratogenic, mutagenic, or carcinogenic. The effects of DNOC in the human due to chronic exposure are basically the same as those effects resulting from acute exposure Although DNOC is considered a cumulative poison in humans, cataract formation is the only chronic effect noted in any human or experimental animal study It is believed that DNOC accumulates in the human body and that toxic symptoms may develop when blood levels exceed 20 mg/kg.

For the protection of human health from the toxic properties of dinitro-o-cresol ingested through water and contaminated aquatic organisms, the ambient water criterion is determined to be 0.0134 mg/l. If contaminated aquatic organisms alone are consumed, excluding the consumption of water, the ambient water criterion is determined to be 0.765 mg/l. No data are available on which to evaluate the adverse effects of 4,6-dinitro-o-cresol on aquatic life.

Some studies have been reported regarding the behavior of DNOC in POTW. Biochemical oxidation of DNOC under laboratory conditions at a concentration of 100 mg/l produced 22 percent degradation in 3.5 hours, using acclimated phenol adapted seed cultures. In addition, the nitro group in the number 4 (para) position seems to impart a destabilizing effect on the molecule. Based on these data and general conclusions relating molecular structure to biochemical oxidation, it is expected that 4,6-dinitro-o-cresol will be biochemically oxidized to a lesser extent than domestic sewage by biological treatment in POTW.

N-nitrosodiphenylamine (62). N-nitrosodiphenylamine $[(C_6H_5)_2NNO]$, also called nitrous diphenylamide, is a yellow crystalline solid manufactured by nitrosation of diphenylamine. It melts at 66C and is insoluble in water, but soluble in several organic solvents other than hydrocarbons. Production in the U.S. has approached 1,500 tons per year. The compound is used as a retarder for rubber vulcanization and as a pesticide for control of scorch (a fungus disease of plants).

N-nitroso compounds are acutely toxic to every animal species tested and are also poisonous to humans. N-nitrosodiphenylamine toxicity in adult rats lies in the mid range of the values for 60 N-nitroso compounds tested. Liver damage is the principal toxic effect. N-nitrosodiphenylamine, unlike many other N-nitrosoamines, does not show mutagenic activity. N-nitrosodiphenylamine has been reported by several investigations to be non-carcinogenic. However in a recent study by the National Cancer Institute, the compound was found to induce a significant incidence of urinary bladder tumors in both male and female rats. Few urinary bladder tumors were observed in mice, although there was a high incidence of non-neoplastic bladder lesions. In addition, N-nitrosodipheylamine is capable of trans-nitrosation and could thereby convert other amines to carcinogenic N-nitrosoamines. Sixty-seven of 87 N-nitrosoamines studied were reported to have carcinogenic activity. No water quality criterion have been proposed for N-nitrosodiphenylamine.

No data are available on the behavior of N-nitrosodiphenylamine in a POTW. Biochemical oxidation of many of the toxic organic pollutants have been investigated, at least in laboratory scale studies, at concentrations higher than those expected to be contained in most municipal wastewaters. General observations have been developed relating molecular structure to ease of degradation for all the toxic organic pollutants. The conclusion reached by study of the limited data is that biological treatment produces little or no removal of N-nitrosodiphenylamine in a POTW. No information is available regarding possible interference by N-nitrosodiphenylamine in POTW processes, or on the possible detrimental effect on sludge used to amend soils in which crops are grown. However, no interference or detrimental effects are expected because N-nitroso compounds are widely distributed in the soil and water environment, at low concentrations, as a result of microbial action on nitrates and nitrosatable compounds.

<u>N-nitrosodi-n-propylamine (63)</u>. No physical properties or usage data could be found for this pollutant. It can be formed from the interaction of nitrite with secondary and tertiary amines

The available data for this pollutant indicate that acute toxicity to freshwater aquatic life occurs at concentrations as low as 5.85 mg/l. No data are available concerning this pollutant's chronic toxicity to freshwater and saltwater aquatic life. The available data indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 3,300 mg/l.

For the maximum protection of human health from the potential carcinogenic effects due to exposure to this pollutant, through the ingestion of contaminatd water and aquatic organisms, the ambient water concentration should be zero. Concentrations of this pollutant estimated to result in additional lifetime cancer risks of risk levels of 10^{-5}, 10^{-6}, and 10^{-7} are 0.00016 mg/l, 0.000016 mg/l, and 0.0000016 mg/l, respectively.

With respect to treatment in POTW, laboratory studies indicate that this pollutant is not amenable to treatment via biochemical oxidation.

<u>Pentachlorophenol (64)</u>. Pentachlorophenol (C_6Cl_5OH) is a white crystalline solid produced commercially by chlorination of phenol or polychlorophenols. U.S. annual production is in excess of 20,000 tons. Pentachlorophenol melts at 190C and is slightly soluble in water (14 mg/l). Pentachlorophenol is not detected by the 4-aminoantipyrene method and so does not contribute to the nonconventional pollutant parameter "Total Phenols".

Pentachlorophenol is a bactericide and fungicide and is used for preservation of wood and wood products. It is competitive with creosote in that application. It is also used as a preservative in glues, starches, and photographic papers. It is an effective algicide and herbicide.

Although data are available on the human toxicity effects of pentachlorophenol, interpretation of data is frequently uncertain. Occupational exposure observations must be examined carefully because exposure to pentachlorophenol is frequently accompanied by exposure to other wood preservatives Additionally, experimental results and occupational exposure observations must be examined carefully to make sure that observed effects are produced by the pentachlorophenol itself and not by the by-products which usually contaminate pentachlorophenol.

Acute and chronic toxic effects of pentachlorophenol in humans are similar; muscle weakness, headache, loss of appetite, abdominal pain, weight loss, and irritation of skin, eyes, and respiratory tract. Available literature indicates that pentachlorophenol does not accumulate in body tissues to any significant extent. Studies on laboratory animals of distribution of the compound in body tissues showed the highest levels of pentachlorophenol in liver, kidney, and intestine, while the lowest levels were in brain, fat, muscle, and bone.

Toxic effects of pentachlorophenol in aquatic organisms are much greater at pH 6 where this weak acid is predominantly in the undissociated form than at pH 9 where the ionic form predominates. Similar results were observed in mammals where oral lethal doses of pentachlorophenol were lower when the compound was administered in hydrocarbon solvents (un-ionized form) than when it was administered as the sodium salt (ionized form) in water.

There appear to be no significant teratogenic, mutagenic, or carcinogenic effects of pentachlorophenol.

For the protection of human health from the toxic properties of pentachlorophenol ingested through water and through contaminated aquatic organisms, the ambient water quality criterion is determined to be 0.140 mg/l.

Some data are available on the behavior of pentachlorophenol in a POTW. Pentachlorophenol has been found in the influent to a POTW. In a study of one POTW the mean removal was 59 percent over a seven day period. Trickling filters removed 44 percent at the influent pentachlorophenol, suggesting that biological degradation occurs. The same report compared removal of pentachlorophenol at the same plant and two additional POTW facilities on a later date and obtained values of 4.4, 19.5 and 28.6 percent removal, the last value being for the plant which was 59 percent removal in the original study. Influent concentrations of pentachlorophenol ranged from 0.0014 to 0.0046 mg/l. Other studies, including the general review of data relating molecular structure to biological oxidation, indicate that pentachlorophenol is not removed by biological treatment processes in a POTW. Anaerobic digestion processes are inhibited by 0.4 mg/l pentachlorophenol. The most recent EPA study of the behavior of toxic organics in a POTW indicates that pentachlorophenol is 52 percent removed.

The low water solubility and low volatility of pentachlorophenol lead to the expectation that most of the compound will remain in the sludge in a POTW. The effect on plants grown on land treated with pentachlorophenol-containing sludge is unpredictable. Laboratory studies show that this compound affects crop germination at 5.4 mg/l. However, photodecomposition of pentachlorophenol occurs in sunlight. The effects of the various breakdown products which may remain in the soil was not found in the literature.

<u>Phenol (65)</u>. Phenol, also called hydroxybenzene and carbolic acid, is a clear, colorless, hygroscopic, deliquescent, crystal line solid at room temperature. Its melting point is 43C and its vapor pressure at room temperature is 0.35 mm Hg. It is very soluble in water (67 gm/l at 16C) and can be dissolved in benzene, oils, and petroleum solids. Its formula is C_6H_5OH.

Although a small percent of the annual production of phenol is derived from coal tar as a naturally occuring product, most of the phenol is synthesized. Two of the methods are fusion of benzene sulfonate with sodium hydroxide, and oxidation of cumene followed by cleavage with a catalyst. Annual production in the U.S. is in excess of one million tons. Phenol is generated during distillation of wood and the microbiological decomposition of organic matter in the mammalian intestinal tract.

Phenol is used as a disinfectant, in the manufacture of resins, dyestuffs, and in pharmaceuticals, and in the photo processing industry. In this discussion, phenol is the specific compound which is separated by methylene chloride extraction of an acidified sample and identified and quantified by GC/MS. Phenol also contributes to the "Total Phenols," discussed elsewhere which are determined by the 4-AAP colorimetric method.

Phenol exhibits acute and sub-acute toxicity in humans and laboratory animals. Acute oral doses of phenol in humans cause sudden collapse and unconsciousness by its action on the central nervous system. Death occurs by respiratory arrest. Sub-acute oral doses in mammals are rapidly absorbed and quickly distributed to various organs, then cleared from the body by urinary excretion and metabolism. Long term exposure by drinking phenol contaminated water has resulted in statistically significant increase in reported cases of diarrhea, mouth sores, and burning of the mouth. In laboratory animals, long term oral administration at low levels produced slight liver and kidney damage. No reports were found regarding carcinogenicity of phenol administered orally -- all carcinogenicity studies were skin test.

For the protection of human health from phenol ingested through water and through contaminated aquatic organisms, the concentration in water should not exceed 3.4 mg/l.

Fish and other aquatic organisms demonstrated a wide range of sensitivities to phenol concentration. However, acute toxicity values were at moderate levels when compared to other toxic organic pollutants.

Data have been developed on the behavior of phenol in a POTW. Phenol is biodegradable by biota present in a POTW. The ability of a POTW to treat phenol-bearing influents depends upon acclimation of the biota and the constancy of the phenol concentration. It appears that an induction period is required to build up the population of organisms which can degrade phenol. Too large a concentration will result in upset or pass though in the POTW, but the specific level causing upset depends on the immediate past history of phenol concentrations in the influent. Phenol levels as high as 200 mg/l have been treated with 95 percent removal in a POTW, but more or less continuous presence of phenol is necessary to maintain the population of microorganisms that degrade phenol.

Phenol which is not degraded is expected to pass through the POTW because of its very high water solubility. However, in a POTW where chlorination is practiced for disinfection of the POTW effluent, chlorination of phenol may occur. The products of that reaction may be toxic pollutants.

The EPA has developed data on influent and effluent concentrations of total phenols in a study of 103 POTW facilities. However, the analytical procedure was the 4-AAP method mentioned earlier and not the GC/MS method specifically for phenol. Discussion of the study, which of course includes phenol, is presented under the pollutant heading "Total Phenols." The most recent study by EPA on the behavior of toxic organics in a POTW indicates that phenol is 96 percent removed.

<u>Phthalate Esters (66-71)</u>. Phthalic acid, or 1,2-benzene dicarboxylic acid, is one of three isomeric benzenedicarboxylic acids produced by the chemical industry. The other two isomeric forms are called isophthalic and terephthalic acids. The formula for all three acids is $C_6H_4(COOH)_2$. Some esters of phthalic acid are designated as toxic pollutants. They will be

discussed as a group here, and specific properties of individual phthalate esters will be discussed afterwards.

Phthalic acid esters are manufactured in the U.S. at an annual rate in excess of one billion pounds. They are used as plasticizers -- primarily in the production of polyvinyl chloride (PVC) resins. The most widely used phthalate plasticizer is bis (2-ethylhexyl) phthalate (66) which accounts for nearly one-third of the phthalate esters produced. This particular ester is commonly referred to as dioctyl phthalate (DOP) and should not be confused with one of the less used esters, di-n-octyl phthalate (69), which is also used as a plasticizer. In addition to these two isomeric dioctyl phthalates, four other esters, also used primarily as plasticizers, are designated as toxic pollutants. They are: butyl benzyl phthalate (67), di-n-butyl phthalate (68), diethyl phthalate (70), and dimethyl phthalate (71).

Industrially, phthalate esters are prepared from phthalic anhydride and the specific alcohol to form the ester. Some evidence is available suggesting that phthalic acid esters also may be synthesized by certain plant and animal tissues. The extent to which this occurs in nature is not known.

Phthalate esters used as plasticizers can be present in concentrations up to 60 percent of the total weight of the PVC plastic. The plasticizer is not linked by primary chemical bonds to the PVC resin. Rather, it is locked into the structure of intermeshing polymer molecules and held by van der Waals forces. The result is that the plasticizer is easily extracted. Plasticizers are responsible for the odor associated with new plastic toys or flexible sheet that has been contained in a sealed package.

Although the phthalate esters are not soluble or are only very slightly soluble in water, they do migrate into aqueous solutions placed in contact with the plastic. Thus, industrial facilities with tank linings, wire and cable coverings, tubing, and sheet flooring of PVC are expected to discharge some phthalate esters in their raw waste. In addition to their use as plasticizers, phthalate esters are used in lubricating oils and pesticide carriers. These also can contribute to industrial discharge of phthalate esters.

From the accumulated data on acute toxicity in animals, phthalate esters may be considered as having a rather low order of toxicity. Human toxicity data are limited. It is thought that the toxic effect of the esters is most likely due to one of the metabolic products, in particular the monoester. Oral acute toxicity in animals is greater for the lower molecular weight esters than for the higher molecular weight esters.

Orally administered phthalate esters generally produced enlarging of liver and kidney, and atrophy of testes in laboratory animals. Specific esters produced enlargement of heart and brain, spleenitis, and degeneration of central nervous system tissue.

Subacute doses administered orally to laboratory animals produced some decrease in growth and degeneration of the testes. Chronic studies in animals showed similar effects to those found in acute and subacute studies, but to a much lower degree. The same organs were enlarged, but pathological changes were not usually detected.

A recent study of several phthalic esters produced suggestive but not conclusive evidence that dimethyl and diethyl phthalates have a cancer liability. Only four of the six toxic pollutant esters were included in the study. Phthalate esters do bioconcentrate in fish. The factors, weighted for relative consumption of various aquatic and marine food groups, are used to calculate ambient water quality criteria for four phthalate esters. The values are included in the discussion of the specific esters.

Studies of toxicity of phthalate esters in freshwater and salt water organisms are scarce. A chronic toxicity test with bis(2-ethylhexyl) phthalate showed that significant reproductive impairment occurred at 0.003 mg/l in the freshwater crustacean, Daphnia magna. In acute toxicity studies, saltwater fish and organisms showed sensitivity differences of up to eight-fold to butyl benzyl, diethyl, and dimethyl phthalates. This suggests that each ester must be evaluated individually for toxic effects.

The biochemical oxidation of many of the toxic organic pollutants has been investigated in laboratory scale studies at concentrations higher than would normally be expected in municipal wastewaters. Three of the phthalate esters were studed. Bis(2-ethylhexyl) phthalate was found to be degraded slightly or not at all and its removal by biological treatment in a POTW is expected to be slight or zero. Di-n-butyl phthalate and diethyl phthalate were degraded to a moderate degree and their removal by biological treatment in a POTW is expected to occur to a moderate degree. Using these data and other observations relating molecular structure to ease of biochemical degradation of other toxic organic pollutants, the conclusion was reached that butyl benzyl phthalate and dimethyl phthalate would be removed in a POTW to a moderate degree by biological treatment. On the same basis, it was concluded that di-n-octyl phthalate would be removed to a slight degree or not at all. An EPA study of seven POTW facilities revealed that for all but di-n-octyl phthalate, which was not studied, removals ranged from 62 to 87 percent. The most recent EPA study of the behavior of toxic organics in POTW indicates removals ranging from 48 percent to 81 percent for the six phthalate esters designated as toxic pollutants.

No information was found on possible interference with POTW operation or the possible effects on sludge by the phthalate esters. The water insoluble phthalate esters -- butyl benzyl and di-n-octyl phthalate -- would tend to remain in sludge, whereas the other four toxic pollutant phthalate esters with water solubilities ranging from 50 mg/l to 4.5 mg/l would probably pass through into the POTW effluent.

Bis(2-ethylhexyl) Phthalate (66). In addition to the general remarks and discussion on phthalate esters, specific information on bis(2-ethylhexyl) phthalate is provided. Little information is available about the physical properties of bis(2-ethylhexyl) phthalate. It is a liquid boiling at 387C at 5mm Hg and is insoluble in water. Its formula is $C_6H_4(COOC_8H_{17})$. This toxic pollutant format constitutes about one-third of the phthalate ester production in the U.S. It is commonly referred to as dioctyl phthalate, or DOP, in the plastics industry where it is the most extensively used compound for the plasticization of polyvinyl chloride (PVC). Bis(2-ethylhexyl) phthalate has been approved by the FDA for use in plastics in contact with food. Therefore, it may be found in wastewaters coming in contact with discarded plastic food wrappers as well as the PVC films and shapes normally found in industrial plants. This toxic pollutant is also a commonly used organic diffusion pump oil, where its low vapor pressure is an advantage.

For the protection of human health from the toxic properties of bis(2-ethylhexyl) phthalate ingested through water and through contaminated aquatic organisms, the ambient water quality criterion is determined to be 15 mg/l. If contaminated aquatic organisms alone are consumed, excluding the consumption of water, the ambient water criteria is determined to be 50 mg/l.

Biochemical oxidation of this toxic pollutant has been studied on a laboratory scale at concentrations higher than would normally be expected in municipal wastewater. In fresh water with a non-acclimated seed culture no biochemical oxidation was observed after 5, 10, and 20 days. However, with an acclimated seed culture, biological oxidation occured to the extents of 13, 0, 6, and 23 percent of theoretical after 5, 10, 15 and 20 days, respectively. Bis(2-ethylhexyl) phthalate concentrations were 3 to 10 mg/l. Little or no removal of bis(2-ethylhexyl) phthalate by biological treatment in a POTW is expected. The most recent EPA study of the behavior of toxic organics in a POTW indicates that bis(2-ethylhexyl) phthalate is 62 percent removed.

Butyl Benzyl Phthalate (67). In addition to the general remarks and discussion on phthalate esters, specific information on butyl benzyl phthalate is provided. No information was found on the physical properties of this compound.

Butyl benzyl phthalate is used as a plasticizer for PVC. Two special applications differentiate it from other phthalate esters. It is approved by the U.S. FDA for food contact in wrappers and containers; and it is the industry standard for plasticization of vinyl flooring because it provides stain resistance.

No ambient water quality criterion is proposed for butyl benzyl phthalate.

Butyl benzyl phthalate removal in a POTW by biological treatment is expected to occur to a moderate degree. The most recent EPA study of the behavior of toxic organics in POTWs indicates that butyl benzyl phthalate is 59 percent removed.

Di-n-butyl Phthalate (68). In addition to the general remarks and discussion on phthalate esters, specific information on di-n-butyl phthalate (DBP) is provided. DBP is a colorless, oil liquid, boiling at 340C. Its water solubility at room temperature is reported to be 0.4 g/l and 4.5 g/l in two different chemistry handbooks. The formula for DBP, $C_6H_4(COOC_4H)_2$ is the same as for its isomer, di-isobutyl phthalate. DBP production is 1 to 2 percent of total U.S. phthalate ester production.

Dibutyl phthalate is used to a limited extent as a plasticizer for polyvinyl chloride (PVC). It is not approved for contact with food. It is used in liquid lipsticks and as a diluent for polysulfide dental impression materials. DBP is used as a plasticizer for nitrocellulose in making gun powder, and as a fuel in solid propellants for rockets. Further uses are insecticides, safety glass manufacture, textile lubricating agents, printing inks, adhesives, paper coatings, and resin solvents.

For protection of human health from the toxic properties of dibutyl phthalate ingested through water and through contaminated aquatic organisms, the ambient water quality criterion is determined to be 34 mg/l. If contaminated aquatic organisms alone are consumed, excluding the consumption of water, the ambient water criterion is 154 mg/l.

Biochemical oxidation of this toxic pollutant has been studied on a laboratory scale at concentrations higher than would normally be expected in municipal wastewaters. Biochemical oxidation of 35, 43, and 45 percent of theoretical oxidation were obtained after 5, 10, and 20 days, respectively, using sewage microorganisms as an unacclimated seed culture.

Biological treatment in a POTW is expected to remove di-n-butyl phthalate to a moderate degree. The most recent EPA study of the behavior of toxic organics in a POTW indicates that di-n-butyl phthalate is 48 percent removed.

Di-n-octyl phthalate (69). In addition to the general remarks and discussion on phthalate esters, specific information on di-n-octyl phthalate is provided. Di-n-octyl phthalate is not to be confused with the isomeric bis(2-ethylhexyl) phthalate which is commonly referred to in the plastics industry as DOP. Di-n-octyl phthalate is a liquid which boils at 220C at 5 mm Hg. It is insoluble in water. Its molecular formula is $C_6H_4(COOC_8H_{17})_2$. Its production constitutes about 1 percent of all phthalate ester production in the U.S.

Industrially, di-n-octyl phthalate is used to plasticize polyvinyl chloride (PVC) resins.

No ambient water quality criterion is proposed for di-n-octyl phthalate.

Biological treatment in a POTW is expected to lead to little or no removal of di-n-octyl phthalate. The most recent EPA study of the behavior of toxic organics in POTWs indicates that di-n-octyl phthalate is 81 percent removed.

Diethyl phthalate (70). In addition to the general remarks and discussion on phthalate esters, specific information on diethyl phthalate is provided. Diethyl phthalate, or DEP, is a colorless liquid boiling at 296C, and is insoluble in water. Its molecular formula is $C_6H_4(COOC_2H_5)_2$. Production of diethyl phthalate constitutes about 1.5 percent of phthalate ester production in the U.S.

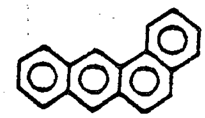
Diethyl phthalate is approved for use in plastic food containers by the U.S. FDA. In addition to its use as a polyvinyl chloride (PVC) plasticizer, DEP is used to plasticize cellulose nitrate for gun powder, to dilute polysulfide dental impression materials, and as an accelerator for dyeing triacetate fibers. An additional use which would contribute to its wide distribution in the environment is as an approved special denaturant for ethyl alcohol. The alcohol-containing products for which DEP is an approved denaturant include a wide range of personal care items such as bath preparations, bay rum, colognes, hair preparations, face and hand creams, perfumes and toilet soaps. Additionally, this denaturant is approved for use in biocides, cleaning solutions, disinfectants, insecticides, fungicides, and room deoderants which have ethyl alcohol as part of the formulation. It is expected, therefore, that people and buildings would have some surface loading of this toxic pollutant which would find its way into raw wastewaters.

For the protection of human health from the toxic properties of diethyl phthalate ingested through water and through contaminated aquatic organisms, the ambient water quality criterion is determined to be 350 mg/l. If contaminated aquatic organisms alone are consumed, excluding the consumption of water, the ambient water criterion is 1,800 mg/l.

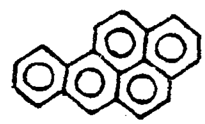
Biochemical oxidation of this toxic pollutant has been studied on a laboratory scale at concentrations higher than would normally be expected in municipal wastewaters. Biochemical oxidation of 79, 84, and 89 percent of theoretical was observed after 5, 15, and 20 days respectively. Biological treatment in a POTW is expected to lead to a moderate degree of removal of diethyl phthalate. The most recent EPA study of the behavior of toxic organics in POTWs indicates that diethyl phthalate is 74 percent removed.

Polynuclear Aromatic Hydrocarbons (72-84). The polynuclear aromatic hydrocarbons (PAH) selected as toxic pollutants are a group of 13 compounds consisting of substituted and unsubstituted polycyclic aromatic rings. The general class of PAH includes heterocyclics, but none of those were selected as toxic pollutants. PAH are formed as the result of incomplete combustion when organic compounds are burned with insufficient oxygen. PAH are found in coke oven emissions, vehicular emissions, and volatile products of oil and gas burning. The compounds chosen as toxic pollutants are listed with their structural formula and melting point (m.p.). All are insoluble in water.

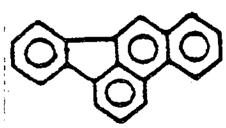
72 Benzo(a)anthracene (1,2-benzanthracene) m.p. 162C



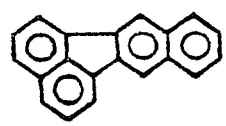
73 Benzo(a)pyrene (3,4-benzopyrene) m.p. 176C



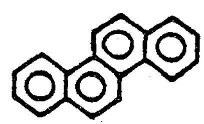
74 3,4-Benzofluoranthene m.p. 168C



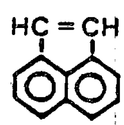
75 Benzo(k)fluoranthene (11,12-benzofluoranthene) m.p. 217C



76 Chrysene (1,2-benzphenanthrene) m.p. 255C

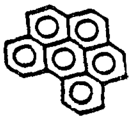


77 Acenaphthylene m.p. 92C

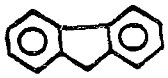


78 Anthracene m.p. 216C

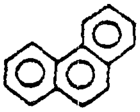
79 Benzo(ghi)perylene (1,12-benzoperylene) m.p. not reported



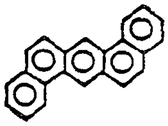
80 Fluorene (alpha-diphenylenemethane) m.p. 116C



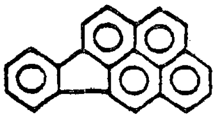
81 Phenanthrene m.p. 101C

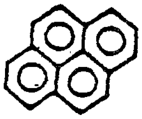


82 Dibenzo(a,h)anthracene (1,2,5,6-dibenzoanthracene) m.p. 269C



83 Indeno (1,2,3-cd)pyrene (2,3-o-phenylenepyrene) m.p. not available





84 Pyrene m.p. 156C

Some of these toxic pollutants have commercial or industrial uses. Benzo(a)anthracene, benzo(a)pyrene, chrysene, anthracene, dibenzo(a,h)anthracene, and pyrene are all used as antioxidants. Chrysene, acenaphthylene, anthracene, fluorene, phenanthrene, and pyrene are all used for synthesis of dyestuffs or other organic chemicals. 3,4-Benzofluoranthrene, benzo(k)fluoranthene, benzo (ghi)perylene, and indeno (1,2,3-cd)pyrene have no known industrial uses, according to the results of a recent literature search.

Several of the PAH toxic pollutants are found in smoked meats, in smoke flavoring mixtures, in vegetable oils, and in coffee. Consequently, they are also found in many drinking water supplies. The wide distribution of these pollutants in complex mixtures with the many other PAHs which have not been designated as toxic pollutants results in exposures by humans that cannot be associated with specific individual compounds.
The screening and verification analysis procedures used for the toxic organic pollutants are based on gas chromatography (GC). Three pairs of the PAH have identical elution times on the column specified in the protocol, which means that the parameters of the pair are not differentiated. For these three pairs [anthracene (78) - phenanthrene (81); 3,4-benzofluoranthene (74) - benzo(k)-fluoranthene (75); and benzo(a)anthracene (72) - chrysene (76)] results are obtained and reported as "either-or." Either both are present in the combined concentration reported, or one is present in the concentration reported.

There are no studies to document the possible carcinogenic risks to humans by direct ingestion. Air pollution studies indicate an excess of lung cancer mortality among workers exposed to large amounts of PAH containing materials such as coal gas, tars, and coke-oven emissions. However, no definite proof exists that the PAH present in these materials are responsible for the cancers observed.

Animal studies have demonstrated the toxicity of PAH by oral and dermal administration. The carcinogenicity of PAH has been traced to formation of PAH metabolites which, in turn, lead to tumor formation. Because the levels of PAH which induce cancer are very low, little work has been done on other health hazards resulting from exposure. It has been established in animal studies that tissue damage and systemic toxicity can result from exposure to non-carcinogenic PAH compounds.

Because there were no studies available regarding chronic oral exposures to PAH mixtures, proposed water quality criteria were derived using data on exposure to a single compound. Two studies were selected, one involving benzo(a)pyrene ingestion and one involving dibenzo(a,h)anthracene ingestion. Both are known animal carcinogens.

For the maximum protection of human health from the potential carcinogenic effects of exposure to polynuclear aromatic hydrocarbons (PAH) through ingestion of water and contaminated aquatic organisms, the ambient water concentration is zero. Concentrations of PAH estimated to result in additional risk of 1 in 100,000 were derived by the EPA and the Agency is considering setting criteria at an interim target risk level in the range of 10^{-7}, 10^{-6}, or 10^{-5} with corresponding criteria of 0.000000097 mg/l, 0.00000097 mg/l, and 0.0000097 mg/l, respectively.

No standard toxicity tests have been reported for freshwater or saltwater organisms and any of the 13 PAH discussed here.

The behavior of PAH in a POTW has received only a limited amount of study. It is reported that up to 90 percent of PAH entering a POTW will be retained in the sludge generated by conventional sewage treatment processes. Some of the PAH can inhibit bacterial growth when they are present at concentrations as low as 0.018 mg/l. Biological treatment in activated sludge units has been shown to reduce the concentration of phenanthrene and anthracene to some extent; however, a study of biochemical oxidation of fluorene on a laboratory scale showed no degradation after 5, 10, and 20 days. On the basis of that study and studies of other toxic organic pollutants, some general observations were made relating molecular structure to ease of degradation. Those observations lead to the conclusion that the 13 PAH selected to represent that group as toxic pollutants will be removed only slightly or not at all by biological treatment methods in a POTW. Based on their water insolubility and tendency to attach to sediment particles very little pass through of PAH to POTW effluent is expected The most recent EPA study of the behavior of toxic organics in POTW indicates that removals for five of the 13 PAH range from 40 percent to 83 percent.

No data are available at this time to support any conclusions about contamination of land by PAH on which sewage sludge containing PAH is spread.

Tetrachloroethylene (85). Tetrachloroethylene (CCl_2CCl_2), also called perchloroethylene and PCE, is a colorless, nonflammable liquid produced mainly by two methods -- chlorination and pyrolysis of ethane and propane, and oxychlorination of dichloro ethane. U.S. annual production exceeds 300,000 tons. PCE boils at 121C and has a vapor pressure of 19 mm Hg at 20C. It is insoluble in water but soluble in organic solvents.

Approximately two-thirds of the U.S. production of PCE is used for dry cleaning. Textile processing and metal degreasing, in equal amounts consume about one-quarter of the U.S. production.

The principal toxic effect of PCE on humans is central nervous system depression when the compound is inhaled. Headache, fatigue, sleepiness, dizziness, and sensations of intoxication are reported. Severity of effects increases with vapor concentration. High integrated exposure (concentration times duration) produces kidney and liver damage. Very limited data on PCE ingested by laboratory animals indicate liver damage occurs when PCE is administered by that route. PCE tends to distribute to fat in mammalian bodies.

One report found in the literature suggests, but does not conclude, that PCE is teratogenic. PCE has been demonstrated to be a liver carcinogen in B6C3-F1 mice.

For the maximum protection of human health from the potential carcinogenic effects of exposure to tetrachlorethylene through ingestion of water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of tetrachloroethylene estimated to result in additional lifetime cancer risk levels of 10^{-7}, 10^{-6}, and 10^{-5} are 0.000020 mg/l, 0.00020 mg/l, and 0.0020 mg/l, respectively.

Many of the toxic organic pollutants have been investigated, at least in laboratory scale studies, at concentrations higher than those expected to be contained by most municipal wastewaters. General observations have been developed relating molecular structure to ease of degradation for all of the toxic organic pollutants. The conclusions reached by the study of the limited data is that biological treatment produces a moderate removal of PCE in a POTW by degradation. No information was found to indi cate that PCE accumulates in the sludge, but some PCE is expected to be adsorbed onto settling particles. Some PCE is expected to be volatilized in aerobic treatment processes and little, if any, is expected to pass through into the effluent from the POTW. The most recent EPA study of the behavior of toxic organics in POTWs indicates that PCE is 81 percent removed.

<u>Toluene (86)</u>. Toluene is a clear, colorless liquid with a benzene-like odor. It is a naturally occuring compound derived primarily from petroleum or petrochemical processes. Some toluene is obtained from the manufacture of metallurgical coke. Toluene is also referred to as totuol, methylbenzene, methacide, and phenylmethane. It is an aromatic hydrocarbon with the formula C6H5CH3. It boils at 111C and has a vapor pressure of 30 mm Hg at room temperature. The water solubility of toluene is 535 mg/l, and it is miscible with a variety of organic solvents. Annual production of toluene in the U.S. is greater than two million metric tons. Approximately two-thirds of the toluene is converted to benzene and the remaining 30 percent is divided approximately equally into chemical manufacture, and use as a paint solvent and aviation gasoline additive. An estimated 5,000 metric tons is discharged to the environment anually as a constituent in wastewater.

Most data on the effects of toluene in human and other mammals have been based on inhalation exposure or dermal contact studies. There appear to be no reports of oral administration of toluene to human subjects. A long term toxicity study on female rats revealed no adverse effects on growth, mortality, appearance and behavior, organ to body weight ratios, blood-urea nitrogen levels, bone marrow counts, peripheral blood counts, or morphology of major organs. The effects of inhaled toluene on the central nervous system, both at high and low concentrations, have been studied in humans and animals. However, ingested toluene is expected to be handled differently by the body because it is absorbed more slowly and must first pass through the liver before reaching the nervous system. Toluene is extensively and rapidly metabolized in the liver. One of the principal metabolic products of toluene is benzoic acid, which itself seems to have little potential to produce tissue injury.

Toluene does not appear to be teratogenic in laboratory animals or man. Nor is there any conclusive evidence that toluene is mutagenic. Toluene has not been demonstrated to be positive in any in vitro mutagenicity or carcinogenicity bioassay system, nor to be carcinogenic in animals or man.

Toluene has been found in fish caught in harbor waters in the vicinity of petroleum and petrochemical plants. Bioconcentration studies have not been conducted, but bioconcentration factors have been calculated on the basis of the octanol-water partition coefficient.

For the protection of human health from the toxic properties of toluene ingested through water and through contaminated aquatic organisms, the ambient water criterion is determined to be 14.3 mg/l. If contaminated aquatic organisms alone are consumed excluding the consumption of water, the ambient water criterion is 424 mg/l. Available data show that the adverse effects on aquatic life occur at concentrations as low as 5 mg/l.

Acute toxicity tests have been conducted with toluene and a variety of freshwater fish and Daphnia magna. The latter appears to be significantly more resistant than fish. No test results have been reported for the chronic effects of toluene on freshwater fish or invertebrate species.

The biochemical oxidation of many of the toxic pollutants has been investigated in laboratory scale studies at concentrations greater than those expected to be contained by most municipal wastewaters. At toluene concentrations ranging from 3 to 250 mg/l biochemical oxidation proceeded to 50 percent of theoretical or greater. The time period varied from a few hours to 20 days depending on whether or not the seed culture was acclimated. Phenol adapted acclimated seed cultures gave the most rapid and extensive biochemical oxidation.

Based on study of the limited data, it is expected that toluene will be biochemically oxidized to a lesser extent than domestic sewage by biological treatment in a POTW. The volatility and relatively low water solubility of toluene lead to the expectation that aeration processes will remove significant quantities of toluene from the POTW. The EPA studied toluene removal in seven POTW facilities. The removals ranged from 40 to 100 percent Sludge concentrations of toluene ranged from 54 x 10^{-3} to 1.85 mg/l. The most recent EPA study of the behavior of toxic organics in a POTW indicates that toluene is 90 percent removed.

<u>Trichloroethylene (87)</u>. Trichloroethylene (1,1,2-trichloroethylene or TCE) is a clear, colorless liquid boiling at 87C. It has a vapor pressure of 77 mm Hg at room temperature and is slightly soluble in water (1 g/l). U.S. production is greater than 0.25

million metric tons annually. It is produced from tetrachloroethane by treatment with lime in the presence of water.

TCE is used for vapor phase degreasing of metal parts, cleaning and drying electronic components, as a solvent for paints, as a refrigerant, for extraction of oils, fats, and waxes, and for dry cleaning. Its widespread use and relatively high volatility result in detectable levels in many parts of the environment.

Data on the effects produced by ingested TCE are limited. Most studies have been directed at inhalation exposure. Nervous system disorders and liver damage are frequent results of inhalation exposure. In the short term exposures, TCE acts as a central nervous system depressant -- it was used as an anesthetic before its other long term effects were defined.

TCE has been shown to induce transformation in a highly sensitive in vitro Fischer rat embryo cell system (F1706) that is used for identifying carcinogens. Severe and persistent toxicity to the liver was recently demonstrated when TCE was shown to produce carcinoma of the liver in mouse strain B6C3F1 One systematic study of TCE exposure and the incidence of human cancer was based on 518 men exposed to TCE. The authors of that study concluded that although the cancer risk to man cannot be ruled out, exposure to low levels of TCE probably does not present a very serious and general cancer hazard.

TCE is bioconcentrated in aquatic species, making the consumption of such species by humans a significant source of TCE. For the protection of human health from the potential carcinogenic effects of exposure to trichloroethylene through ingestion of water and contaminated aquatic organisms, the ambient water concentration is zero. Concentrations of trichloroethylene estimated to result in additional lifetime cancer risks of 10^{-7}, 10^{-6}, and 10^{-5} are 0.00027 mg/l, 0.0027 mg/l, and 0.027 mg/l, respectively. If contaminated aquatic organisms alone are consumed excluding the consumption of water, the water concentration should be less than 0.807 mg/l to keep the additional lifetime cancer risk below 10^{-5}.

Only a very limited amount of data on the effects of TCE on freshwater aquatic life are available. One species of fish (fat head minnows) showed a loss of equilibrium at concentrations below those resulting in lethal effects.

In laboratory scale studies of toxic organic pollutants, TCE was subjected to biochemical oxidation conditions. After 5, 10, and 20 days no biochemical oxidation occurred. On the basis of this study and general observations relating molecular structure to ease of degradation, the conclusion is reached that TCE would undergo no removal by biological treatment in a POTW. The volatility and relatively low water solubility of TCE is expected to result in volatilization of some of the TCE in aeration steps in a POTW. The most recent EPA study of the behavior of toxic organics in a POTW indicates that TCE is 85 percent removed.

Antimony (114). Antimony (chemical name - stibium, symbol Sb), classified as a non-metal or metalloid, is a silvery white, brittle crystalline solid. Antimony is found in small ore bodies throughout the world. Principal ores are oxides of mixed antimony valences, and an oxysulfide ore. Complex ores with metals are important because the antimony is recovered as a by-product. Antimony melts at 631C, and is a poor conductor of electricity and heat.

Annual U.S. consumption of primary antimony ranges from 10,000 to 20,000 tons. About half is consumed in metal products -- mostly antimonial lead for lead acid storage batteries, and about half in non-metal products. A principal compound is antimony trioxide which is used as a flame retardant in fabrics, and as an opacifier in glass, ceramics, and enamels. Several antimony compounds are used as catalysts in organic chemicals synthesis, as fluorinating agents (the antimony fluorides), as pigments, and in fire works. Semiconductor applications are economically significant.

Essentially no information on antimony-induced human health effects has been derived from community epidemiology studies. The available data are in literature relating effects observed with therapeutic or medicinal uses of antimony compounds and industrial exposure studies. Large therapeutic doses of antimonial compounds, usually used to treat schistisomiasis, have caused severe nausea, vomiting, convulsions, irregular heart action, liver damage, and skin rashes. Studies of acute industrial antimony poisoning have revealed loss of appetite, diarrhea, headache, and dizziness in addition to the symptoms found in studies of therapeutic doses of antimony.

For the protection of human health from the toxic properties of antimony ingested through water and through contaminated aquatic organisms the ambient water criterion is determined to be 0.146 mg/l. If contaminated aquatic organisms are consumed, excluding the consumption of water, the ambient water criterion is determined to be 45 mg/l. Available data show that adverse effects on aquatic life occur at concentrations higher than those cited for human health risks.

The limited solubility of most antimony compounds expected in a POTW, i.e., the oxides and sulfides, suggests that at least part of the antimony entering a POTW will be precipitated and incorporated into the sludge. However, some antimony is expected to remain dissolved and pass through the POTW into the effluent. Antimony compounds remaining in the sludge under anaerobic conditions may be connected to stibine (SbH_3), a very soluble and very toxic compound. There are no data to show antimony inhibits any POTW processes. The most recent EPA study of the behavior of toxic pollutants in POTW indicates that antimony is 60 percent removed. Antimony is not known to be essential to the growth of plants, and has been reported to be moderately toxic. Therefore, sludge containing large amounts of antimony could be detrimental to plants if it is applied in large amounts to cropland.

<u>Arsenic (115)</u>. Arsenic (chemical symbol As), is classified as a non-metal or metalloid. Elemental arsenic normally exists in the alpha-crystalline metallic form which is steel gray and brittle, and in the beta form which is dark gray and amorphous. Arsenic sublimes at 615C. Arsenic is widely distributed throughout the world in a large number of minerals. The most important commercial source of arsenic is as a by-product from treatment of copper, lead, cobalt, and gold ores. Arsenic is usually marketed as the trioxide (As_2O_3). Annual U.S. production of the trioxide approaches 40,000 tons.

The principal use of arsenic is in agricultural chemicals (herbicides) for controlling weeds in cotton fields. Arsenicals have various applications in medicinal and vetrinary use, as wood preservatives, and in semiconductors.

The effects of arsenic in humans were known by the ancient Greeks and Romans. The principal toxic effects are gastrointestinal disturbances. Breakdown of red blood cells occurs. Symptoms of acute poisoning include vomiting, diarrhea, abdominal pain, lassitude, dizziness, and headache. Longer exposure produced dry, falling hair, brittle, loose nails, eczema, and exfoliation. Arsenicals also exhibit teratogenic and mutagenic effects in humans. Oral administration of arsenic compounds has been associated clinically with skin cancer for nearly one hundred years. Since 1888 numerous studies have linked occupational exposure and therapeutic administration of arsenic compounds to increased incidence of respiratory and skin cancer.

For the maximum protection of human health from the potential carcinogenic effects of exposure to arsenic through ingestion of water and contaminated aquatic organisms, the ambient water concentration should be zero. Concentrations of arsenic estimated to result in additional lifetime cancer risk levels of 10^{-7}, 10^{-6}, and 10^{-5} are 2.2×10^{-7} mg/l, 2.2 10^{-6} mg/l, and 2.2×10^{-5} mg/l, respectively. If contaminated aquatic organisms alone are consumed, excluding the consumption of water, the water concentration should be less than 1.75 x 10^{-4} to keep the increased lifetime cancer risk below 10^{-5}. Available data show that adverse effects on aquatic life occur at concentrations higher than those cited for human health risks.

A few studies have been made regarding the behavior of arsenic in a POTW. One EPA survey of nine POTW facilities reported influent concentrations ranging from 0.0005 to 0.693 mg/l; effluents from three POTW having biological treatment contained 0.0004 to 0.01 mg/l; two POTW facilities showed arsenic removal efficiencies of 50 and 71 percent in biological treatment. Inhibition of treatment processes by sodium arsenate is reported to occur at 0.1 mg/l in activated sludge, and 1.6 mg/l in anaerobic digestion processes. In another study based on data from 60 POTW facilities, arsenic in sludge ranged from 1.6 to 65.6 mg/kg and the median value was 7.8 mg/kg. The most recent EPA study of the behavior of toxic pollutants in POTW indicates that total trivalent arsenic is 65 percent removed. Arsenic in sludge spread on cropland may be taken up by plants grown on that land. Edible plants can take up arsenic, but normally their growth is inhibited before the plants are ready for harvest.

Beryllium (117). Beryllium is a dark gray metal of the alkaline earth family. It is relatively rare, but because of its unique properties finds widespread use as an alloying element, especially for hardening copper which is used in springs, electrical contacts, and non-sparking tools. World production is reported to be in the range of 250 tons annually. However, much more reaches the environment as emissions from coal burning operations. Analysis of coal indicates an average beryllium content of 3 ppm and 0.1 to 1.0 percent in coal ash or fly ash.

The principal ores are beryl ($3BeO \cdot Al_2O_3 \cdot 6SiO_2$) and bertrandite [$Be_4Si_2O_7(OH)_2$]. Only two industrial facilities produce beryllium in the U.S. because of limited demand and the highly toxic character. About two-thirds of the annual production goes into alloys, 20 percent into heat sinks, and 10 percent into beryllium oxide (BeO) ceramic products.

Beryllium has a specific gravity of 1.846, making it the lightest metal with a high melting point (1,350C). Beryllium alloys are corrosion resistant, but the metal corrodes in aqueous environments. Most common beryllium compounds are soluble in water, at least to the extent necessary to produce a toxic concentration of beryllium ions.

Most data on toxicity of beryllium is for inhalation of beryllium oxide dust. Some studies on orally administered beryllium in laboratory animals have been reported. Despite the large number of studies implicating beryllium as a carcinogen, there is no recorded instance of cancer being produced by ingestion. However, a recently convened panel of uninvolved experts concluded that epidemiologic evidence is suggestive that beryllium is a carcinogen in man.

In the aquatic environment beryllium is chronically toxic to aquatic organisms at 0.0053 mg/l. Water softness has a large effect on beryllium toxicity to fish. In soft water, beryllium is reportedly 100 times as toxic as in hard water.

For the maximum protection of human health from the potential carcinogenic effects of exposure to beryllium through ingestion of water and contaminated aquatic organisms the ambient water concentration should be zero. Concentrations of beryllium estimated to result in additional lifetime cancer risk levels of 10^{-7}, 10^{-6}, and 10^{-5} are 0.00000068 mg/l, 0.0000068 mg/l, and 0.000068 mg/l, respectively. If contaminated aquatic organisms alone are consumed excluding the consumption of water, the concentration should be less than 0.00117 mg/l to keep the increased lifetime cancer risk below 10^{-5}.

Information on the behavior of beryllium in a POTW is scarce. Because beryllium hydroxide is insoluble in water, most beryllium entering a POTW will probably be in the form of suspended solids. As a result most of the beryllium will settle and be removed with sludge. However, beryllium has been shown to inhibit several enzyme systems, to interfere with DNA metabolism in the liver, and to induce chromosomal and mitotic abnormalities. This interference in cellular processes may extend to interfere with biological treatment processes. The concentration and effects of beryllium in sludge which could be applied to cropland has not been studied.

<u>Cadmium (118)</u>. Cadmium is a relatively rare metallic element that is seldom found in sufficient quantities in a pure state to warrant mining or extraction from the earth's surface. It is found in trace amounts of about 1 ppm throughout the earth's crust. Cadmium is, however, a valuable by-product of zinc production.

Cadmium is used primarily as an electroplated metal, and is found as an impurity in the secondary refining of zinc, lead, and copper.

Cadmium is an extremely dangerous cumulative toxicant, causing progressive chronic poisoning in mammals, fish, and probably other organisms. The metal is not excreted.

Toxic effects of cadmium on man have been reported from throughout the world. Cadmium may be a factor in the development of such human pathological conditions as kidney disease, testicular tumors, hypertension, arteriosclerosis, growth inhibition, chronic disease of old age, and cancer. Cadmium is normally ingested by humans through food and water as well as by breathing air contaminated by cadmium dust. Cadmium is cumulative in the liver, kidney, pancreas, and thyroid of humans and other animals. A severe bone and kidney syndrome known as itai-itai disease has been documented in Japan as caused by cadmium ingestion via drinking water and contaminated irrigation water. Ingestion of as little as 0.6 mg/day has produced the disease. Cadmium acts synergistically with other metals. Copper and zinc substantially increase its toxicity.

Cadmium is concentrated by marine organisms, particularly molluscs, which accumulate cadmium in calcareous tissues and in the viscera. A concentration factor of 1,000 for cadmium in fish muscle has been reported, as have concentration factors of 3,000 in marine plants and up to 29,600 in certain marine animals. The eggs and larvae of fish are apparently more sensitive than adult fish to poisoning by cadmium, and crustaceans appear to be more sensitive than fish eggs and larvae.

For the protection of human health from the toxic properties of cadmium ingested through water and through contaminated aquatic organisms, the ambient water criterion is determined to be 0.010 mg/l. Available data show that adverse effects on aquatic life occur at concentrations in the same range as those cited for human health, and they are highly dependent on water hardness.

Cadmium is not destroyed when it is introduced into a POTW, and will either pass through to the POTW effluent or be incorporated into the POTW sludge. In addition, it can interfere with the POTW treatment process.

In a study of 189 POTW facilities, 75 percent of the primary plants, 57 percent of the trickling filter plants, 66 percent of the activated sludge plants, and 62 percent of the biological plants allowed over 90 percent of the influent cadmium to pass through to the POTW effluent. Only two of the 189 POTW facilities allowed less than 20 percent pass-through, and none less than 10 percent pass-through. POTW effluent concentrations ranged from 0.001 to 1.97 mg/l (mean 0.028 mg/l, standard deviation 0.167 mg/l). The most recent EPA study of the behavior of toxic pollutants in POTW indicates that cadmium is 38 percent removed.

Cadmium not passed through the POTW will be retained in the sludge where it is likely to build up in concentration. Cadmium contamination of sewage sludge limits its use on land since it increases the level of cadmium in the soil. Data show that cadmium can be incorporated into crops, including vegetables and grains, from contaminated soils. Since the crops themselves show no adverse effects from soils with levels up to 100 mg/kg cadmium, these contaminated crops could have a significant impact on human health. Two Federal agencies have already recognized the potential adverse human health effects posed by the use of sludge on cropland. The FDA recommends that sludge containing over 30 mg/kg of cadmium should not be used on agricultural land. Sewage sludge contains 3 to 300 mg/kg (dry basis) of cadmium mean = 10 mg/kg; median 16 mg/kg. The USDA also recommends placing limits on the total cadmium from sludge that may be applied to land.

Chromium (119). Chromium is an elemental metal usually found as a chromite ($FeO \cdot Cr_2O_3$). The metal is normally produced by reducing the oxide with aluminum. A significant proportion of the chromium used is in the form of compounds such as sodium dichromate (Na_2CrO_4), and chromic acid (CrO_3) -- both are hexavalent chromium compounds.

Chromium is found as an alloying component of many steels (especially high nickel stainless steels) and its compounds are used in electroplating baths, and as corrosion inhibitors for closed water circulation systems.

The two chromium forms most frequently found in industry waste waters are hexavalent and trivalent chromium. Hexavalent chromium is the form used for metal treatments. Some of it is reduced to trivalent chromium as part of the process reaction. The raw wastewater containing both valence states is usually treated first to reduce remaining hexavalent to trivalent chromium, and second to precipitate the trivalent form as the hydroxide. The hexavalent form is not removed by lime treatment.

Chromium, in its various valence states, is hazardous to man. It can produce lung tumors when inhaled, and induces skin sensitizations. Large doses of chromates have corrosive effects on the intestinal tract and can cause inflammation of the kidneys. Hexavalent chromium is a known human carcinogen. Levels of chromate ions that show no effect in man appear to be so low as to prohibit determination, to date.

The toxicity of chromium salts to fish and other aquatic life varies widely with the species, temperature, pH, valence of the chromium, and synergistic or antagonistic effects, especially the effect of water hardness. Studies have shown that trivalent chromium is more toxic to fish of some types than is hexavalent chromium. Hexavalent chromium retards growth of one fish species at 0.0002 mg/l. Fish food organisms and other lower forms of aquatic life are extremely sensitive to chromium. Therefore, both hexavalent and trivalent chromium must be considered harmful to particular fish or organisms.

For the protection of human health from the toxic properties of chromium (except hexavalent chromium) ingested through water and contaminated aquatic organisms, the ambient water quality criterion is 170 mg/l. If contaminated aquatic organisms alone are consumed, excluding the consumption of water, the ambient water criterion for trivalent chromium is 3,443 mg/l. The ambient water quality criterion for hexavalent chromium is recommended to be identical to the existing drinking water standard for total chromium which is 0.050 mg/l.

Chromium is not destroyed when treated by a POTW (although the oxidation state may change), and will either pass through to the POTW effluent or be incorporated into the POTW sludge. Both oxidation states can cause POTW treatment inhibition and can also limit the usefulness of municipal sludge.

Influent concentrations of chromium to POTW facilities have been observed by EPA to range from 0.005 to 14.0 mg/l, with a median concentration of 0.1 mg/l. The efficiencies for removal of chromium by the activated sludge process can vary greatly, depending on chromium concentration in the influent, and other operating conditions at the POTW. Chelation of chromium by organic matter and dissolution due to the presence of carbonates can cause deviations from the predicted behavior in treatment systems.

The systematic presence of chromium compounds will halt nitrification in a POTW for short periods, and most of the chromium will be retained in the sludge solids. Hexavalent chromium has been reported to severely affect the nitrification process, but trivalent chromium has little or no toxicity to activated sludge, except at high concentrations. The presence of iron, copper, and low pH will increase the toxicity of chromium in a POTW by releasing the chromium into solution to be ingested by micro-organisms in the POTW.

The amount of chromium which passes through to the POTW effluent depends on the type of treatment processes used by the POTW. In a study of 240 POTW facilities, 56 percent of the primary plants allowed more than 80 percent pass-through to POTW effluent. More advanced treatment results in less pass through. POTW effluent concentrations ranged from 0.003 to 3.2 mg/l total chromium (mean = 0.197, standard deviation = 0.48), and from 0.002 to 0.1 mg/l hexavalent chromium (mean = 0.017, standard deviation = 0.020). The most recent EPA study of the behavior of toxic pollutants in POTWs indicates that hexavalent chromium is 18 percent removed.

Chromium not passed through the POTW will be retained in the sludge, where it is likely to build up in concentration. Sludge concentrations of total chromium of over 20,000 mg/kg (dry basis) have been observed. Disposal of sludges containing very high concentrations of trivalent chromium can potentially cause problems in uncontrolled landfills. Incineration, or similar destructive oxidation processes, can produce hexavalent chromium from lower valence states. Hexavalent chromium is potentially more toxic than trivalent chromium. In cases where high rates of chrome sludge application on land are used, distinct growth inhibition and plant tissue uptake have been noted.

Pretreatment of discharges substantially reduces the concentration of chromium in sludge. In Buffalo, New York, pretreatment of electroplating waste resulted in a decrease in chromium concentrations in POTW sludge from 2,510 to 1,040 mg/kg. A similar reduction occurred in Grand Rapids, Michigan, POTW facilities where the chromium concentration in sludge decreased from 11,000 to 2,700 mg/kg when pretreatment was made a requirement.

Copper (120). Copper is a metallic element that sometimes is found free, as the native metal, and is also found in minerals such as cuprite (Cu_2O), malechite [$CuCO_3$ $Cu(OH)_2$], azurite [$2CuCO_3.Cu(OH)_2$], chalcopyrite ($CuFeS_2$), and bornite (Cu_5FeS_4). Copper is obtained from these ores by smelting, leaching, and electrolysis. It is used in the plating, electrical, plumbing, and heating equipment industries, as well as in insecticides and fungicides.

Traces of copper are found in all forms of plant and animal life, and the metal is an essential trace element for nutrition. Copper is not considered to be a cumulative systemic poison for humans as it is readily excreted by the body, but it can cause symptoms of gastroenteritis, with nausea and intestinal irritations, at relatively low dosages. The limiting factor in domestic water supplies is taste. To prevent this adverse organoleptic effect of copper in water, a criterion of 1 mg/l has been established.

The toxicity of copper to aquatic organisms varies significantly, not only with the species, but also with the physical and chemical characteristics of the water, including temperature, hardness, turbidity, and carbon dioxide content. In hard water, the toxicity of copper salts may be reduced by the precipitation of copper carbonate or other insoluble compounds. The sulfates of copper and zinc, and of copper and calcium are synergistic in their toxic effect on fish.

Relatively high concentrations of copper may be tolerated by adult fish for short periods of time; the critical effect of copper appears to be its higher toxicity to young or juvenile fish. Concentrations of 0.02 to 0.03 mg/l have proved fatal to some common fish species. In general the salmonoids are very sensitive and the sunfishes are less sensitive to copper.

The recommended criterion to protect freshwater aquatic life is 0.0056 mg/l as a 24-hour average, and 0.012 mg/l maximum concentration at a hardness of 50 mg/l $CaCO_3$. For total recoverable copper the criterion to protect freshwater aquatic life is 0.0056 mg/l as a 24-hour average.

Copper salts cause undesirable color reactions in the food industry and cause pitting when deposited on some other metals such as aluminum and galvanized steel. To control undesirable taste and odor quality of ambient water due to the organoleptic properties of copper, the estimated level is 1.0 mg/l for total recoverable copper.

Irrigation water containing more than minute quantities of copper can be detrimental to certain crops. Copper appears in all soils, and its concentration ranges from 10 to 80 ppm. In soils, copper occurs in association with hydrous oxides of manganese and iron, and also as soluble and insoluble complexes with organic matter. Copper is essential to the life of plants, and the normal range of concentration in plant tissue is from 5 to 20 ppm. Copper concentrations in plants normally do not build up to high levels when toxicity occurs. For example, the concentrations of copper in snapbean leaves and pods was less than 50 and 20 mg/kg, respectively, under conditions of severe copper toxicity. Even under conditions of copper toxicity, most of the excess copper accumulates in the roots; very little is moved to the aerial part of the plant.

Copper is not destroyed when treated by a POTW, and will either pass through to the POTW effluent or be retained in the POTW sludge. It can interfere with the POTW treatment processes and can limit the usefulness of municipal sludge.

The influent concentration of copper to a POTW has been observed by the EPA to range from 0.01 to 1.97 mg/l, with a median concentration of 0.12 mg/l. The copper that is removed from the influent stream of a POTW is absorbed on the sludge or appears in the sludge as the hydroxide of the metal. Bench scale pilot studies have shown that from about 25 percent to 75 percent of the copper passing through the activated sludge process remains in solution in the final effluent. Four-hour slug dosages of copper sulfate in concentrations exceeding 50 mg/l were reported to have severe effects on the removal efficiency of an unacclimated system, with the system returning to normal in about 100 hours. Slug dosages of copper in the form of copper cyanide were observed to have much more severe effects on the activated sludge system, but the total system returned to normal in 24 hours.

In a recent study of 268 POTW facilities, the median pass-through was over 80 percent for primary plants and 40 to 50 percent for trickling filter, activated sludge, and biological treatment plants. POTW effluent concentrations of copper ranged from 0.003 to 1.8 mg/l (mean 0.126, standard deviation 0.242). The most recent EPA study of the behavior of toxic pollutants in POTW indicates that copper is 58 percent removed.

Copper which does not pass through the POTW will be retained in the sludge where it will build up in concentration. The presence of excessive levels of copper in sludge may limit its use on cropland. Sewage sludge contains up to 16,000 mg/kg of copper, with 730 mg/kg as the mean value. These concentrations are significantly greater than those normally found in soil, which usually range from 18 to 80 mg/kg. Experimental data indicate that when dried sludge is spread over tillable land, the copper tends to remain in place down to the depth of the tillage, except for copper which is taken up by plants grown in the soil. Recent investigation has shown that the extractable copper content of sludge-treated soil decreased with time, which suggests a reversion of copper to less soluble forms was occurring.

Cyanide (121). Cyanides are among the most toxic of pollutants commonly observed in industrial wastewaters. Introduction of cyanide into industrial processes is usually by dissolution of potassium cyanide (KCN) or sodium cyanide (NaCN) in process waters. However, hydrogen cyanide (HCN) formed when the above salts are dissolved in water, is probably the most acutely lethal compound.

The relationship of pH to hydrogen cyanide formation is very important. As pH is lowered to below 7, more than 99 percent of the cyanide is present as HCN and less than 1 percent as cyanide ions. Thus, at neutral pH, that of most living organisms, the more toxic form of cyanide prevails.

Cyanide ions combine with numerous heavy metal ions to form complexes. The complexes are in equilibrium with HCN. Thus, the stability of the metal-cyanide complex and the pH determine the concentration of HCN. Stability of the metal-cyanide anion complexes is extremely variable. Those formed with zinc, copper, and cadmium are not stable -- they rapidly dissociate, with production of HCN, in near neutral or acid waters. Some of the complexes are extremely stable. Cobaltocyanide is very resistant to acid distillation in the laboratory. Iron cyanide complexes are also stable, but undergo photodecomposition to give HCN upon exposure to sunlight. Synergistic effects have been demonstrated for the metal cyanide complexes making zinc, copper, and cadmium cyanides more toxic than an equal concentration of sodium cyanide.

The toxic mechanism of cyanide is essentially an inhibition of oxygen metabolism, i.e., rendering the tissues incapable of exchanging oxygen. The cyanogen compounds are true noncumulative protoplasmic poisons. They arrest the activity of all forms of animal life. Cyanide shows a very specific type of toxic action. It inhibits the cytochrome oxidase system. This system is the one which facilitates electron transfer from reduced metabolites to molecular oxygen. The human body can convert cyanide to a non-toxic thiocyanate and eliminate it. However, if the quantity of cyanide ingested is too great at one time, the inhibition of oxygen utilization proves fatal before the detoxifying reaction reduces the cyanide concentration to a safe level.

Cyanides are more toxic to fish than to lower forms of aquatic organisms such as midge larvae, crustaceans, and mussels. Toxicity to fish is a function of chemical form and concentration, and is influenced by the rate of metabolism (temperature), the level of dissolved oxygen, and pH. In laboratory studies free cyanide concentrations ranging from 0.05 to 0.14 mg/l have been proven to be fatal to sensitive fish species including trout, bluegill, and fathead minnows. Levels above 0.2 mg/l are rapidly fatal to most fish species. Long term sublethal concentrations of cyanide as low as 0.01 mg/l have been shown to affect the ability of fish to function normally, e.g., reproduce, grow, and swim.

For the protection of human health from the toxic properties of cyanide ingested through water and through contaminated aquatic organisms, the ambient water quality criterion is determined to be 0.200 mg/l.

Persistence of cyanide in water is highly variable and depends upon the chemical form of cyanide in the water, the concentration of cyanide, and the nature of other constituents. Cyanide may be destroyed by strong oxidizing agents such as permanganate and chlorine. Chlorine is commonly used to oxidize strong cyanide solutions. Carbon dioxide and nitrogen are the products of complete oxidation. But if the reaction is not complete, the very toxic compound, cyanogen chloride, may remain in the treatment system and subsequently be released to the environment. Partial chlorination may occur as part of a POTW treatment, or during the disinfection treatment of surface water for drinking water preparation.

Cyanides can interfere with treatment processes in a POTW, or pass through to ambient waters. At low concentrations and with acclimated microflora, cyanide may be decomposed by microorganisms in anaerobic and aerobic environments or waste treatment systems. However, data indicate that much of the cyanide introduced passes through to the POTW effluent. The mean pass-through of 14 biological plants was 71 percent. In a recent study of 41 POTW facilities the effluent concentrations ranged from 0.002 to 100 mg/l (mean = 2.518, standard deviation = 15.6). Cyanide also enhances the toxicity of metals commonly found in POTW effluents, including the toxic pollutants cadmium, zinc, and copper. The most recent EPA study of the behavior of toxic pollutants in POTWs indicates that free cyanide is 52 percent removed.

Data for Grand Rapids, Michigan, showed a significant decline in cyanide concentrations downstream from the POTW after pretreatment regulations were put in force. Concentrations fell from 0.66 mg/l before, to 0.01 mg/l after pretreatment was required.

Lead (122). Lead is a soft, malleable, ductile, blueish-gray, metallic element, usually obtained from the mineral galena (lead sulfide, PbS), anglesite (lead sulfate, $PbSO_4$), or cerussite (lead carbonate, $PbCO_3$). Because it is usually associated with minerals of zinc, silver, copper, gold, cadmium, antimony, and arsenic, special purification methods are frequently used before and after extraction of the metal from the ore concentrate by smelting.

Lead is widely used for its corrosion resistance, sound and vibration absorption, low melting point (solders), and relatively high imperviousness to various forms of radiation. Small amounts of copper, antimony and other metals can be alloyed with lead to achieve greater hardness, stiffness, or corrosion resistance than is afforded by the pure metal. Lead compounds are used in glazes and paints. About one third of U.S. lead consumption goes into storage batteries. About half of U.S. lead consumption is from secondary lead recovery. U.S. consumption of lead is in the range of one million tons annually.

Lead ingested by humans produces a variety of toxic effects including impaired reproductive ability, disturbances in blood chemistry, neurological disorders, kidney damage, and adverse cardiovascular effects. Exposure to lead in the diet results in permanent increase in lead levels in the body. Most of the lead entering the body eventually becomes localized in the bones where it accumulates. Lead is a carcinogen or cocarcinogen in some species of experimental animals. Lead is teratogenic in experimental animals. Mutagenicity data are not available for lead.

The ambient water quality criterion for lead is recommended to be identical to the existing drinking water standard which is 0.050 mg/l. Available data show that adverse effect on aquatic life occur at concentrations as low as 7.5×10^{-4} mg/l of total recoverable lead as a 24-hour average with a water hardness of 50 mg/l as $CaCO_3$.

Lead is not destroyed in a POTW, but is passed through to the effluent or retained in the POTW sludge; it can interfere with POTW treatment processes and can limit the usefulness of POTW sludge for application to agricultural croplands. Threshold concentration for inhibition of the activated sludge process is 0.1

mg/l, and for the nitrification process is 0.5 mg/l. In a study of 214 POTW facilities, median pass through values were over 80 percent for primary plants and over 60 percent for trickling filter, activated sludge, and biological process plants. Lead concentration in POTW effluents ranged from 0.003 to 1.8 mg/l (mean = 0.106 mg/l, standard deviation = 0.222). The most recent EPA study of the behavior of toxic pollutants in a POTW indicates that lead is 48 percent removed.

Application of lead-containing sludge to cropland should not lead to uptake by crops under most conditions because normally lead is strongly bound by soil. However, under the unusual condition of low pH (less than 5.5) and low concentrations of labile phosphorus, lead solubility is increased and plants can accumulate lead.

Mercury (123). Mercury is an elemental metal rarely found in nature as the free metal. Mercury is unique among metals as it remains a liquid down to about 39 degrees below zero. It is relatively inert chemically and is insoluble in water. The principal ore is cinnabar (HgS).

Mercury is used industrially as the metal and as mercurous and mercuric salts and compounds. Mercury is used in several types of batteries. Mercury released to the aqueous environment is subject to biomethylation -- conversion to the extremely toxic methyl mercury.

Mercury can be introduced into the body through the skin and the respiratory system as the elemental vapor. Mercuric salts are highly toxic to humans and can be absorbed through the gastrointestinal tract. Fatal doses can vary from 1 to 30 grams. Chronic toxicity of methyl mercury is evidenced primarily by neurological symptoms. Some mercuric salts cause death by kidney failure.

Mercuric salts are extremely toxic to fish and other aquatic life. Mercuric chloride is more lethal than copper, hexavalent chromium, zinc, nickel, and lead towards fish and aquatic life. In the food cycle, algae containing mercury up to 100 times the concentration in the surrounding sea water are eaten by fish which further concentrate the mercury. Predators that eat the fish in turn concentrate the mercury even further.

For the protection of human health from the toxic properties of mercury ingested through water and through contaminated aquatic organisms the ambient water criterion is determined to be 0.0002 mg/l.

Mercury is not destroyed when treated by a POTW, and will either pass through to the POTW effluent or be incorporated into the POTW sludge. At low concentrations it may reduce POTW removal efficiencies, and at high concentrations it may upset the POTW operation.

The influent concentrations of mercury to a POTW have been observed by the EPA to range from 0.002 to 0.24 mg/l, with a median concentration of 0.001 mg/l. Mercury has been reported in the literature to have inhibiting effects upon an activated sludge POTW at levels as low as 0.1 mg/l. At 5 mg/l of mercury, losses of COD removal efficiency of 14 to 40 percent have been reported, while at 10 mg/l loss of removal of 59 percent has been reported. Upset of an activated sludge POTW is reported in the literature to occur near 200 mg/l. The anaerobic digestion process is much less affected by the presence of mercury, with inhibitory effects being reported at 1,365 mg/l.

In a study of 22 POTW facilities having secondary treatment, the range of removal of mercury from the influent to the POTW ranged from 4 to 99 percent with median removal of 41 percent. The most recent EPA study of the behavior of toxic pollutants in POTW indicates that mercury is 69 percent removed. Thus significant pass through of mercury may occur.

In sludges, mercury content may be high if industrial sources of mercury contamination are present. Little is known about the form in which mercury occurs in sludge. Mercury may undergo biological methylation in sediments, but no methylation has been observed in soils, mud, or sewage sludge.

The mercury content of soils not receiving additions of POTW sewage sludge lie in the range from 0.01 to 0.5 mg/kg. In soils receiving POTW sludges for protracted periods, the concentration of mercury has been observed to approach 1.0 mg/kg. In the soil, mercury enters into reactions with the exchange complex of clay and organic fractions, forming both ionic and covalent bonds. Chemical and microbiological degradation of mercurials can take place side by side in the soil, and the products -- ionic or molecular -- are retained by organic matter and clay or may be volatilized if gaseous. Because of the high affinity between mercury and the solid soil surfaces, mercury persists in the upper layer of the soil.

Mercury can enter plants through the roots, it can readily move to other parts of the plant, and it has been reported to cause injury to plants. In many plants mercury concentrations range from 0.01 to 0.20 mg/kg, but when plants are supplied with high levels of mercury, these concentrations can exceed 0.5 mg/kg. Bioconcentration occurs in animals ingesting mercury in food.

Nickel (124). Nickel is seldom found in nature as the pure elemental metal. It is a relatively plentiful element and is widely distributed throughout the earth's crust. It occurs in marine organisms and is found in the oceans. The chief commercial ores for nickel are pentlandite [$(Fe,Ni)_9S_8$], and a lateritic ore consisting of hydrated nickel-iron-magnesium silicate.

Nickel has many and varied uses. It is used in alloys and as the pure metal. Nickel salts are used for electroplating baths.

The toxicity of nickel to man is thought to be very low, and systemic poisoning of human beings by nickel or nickel salts is almost unknown. In non-human mammals nickel acts to inhibit insulin release, depress growth, and reduce cholesterol. A high incidence of cancer of the lung and nose has been reported in humans engaged in the refining of nickel.

Nickel salts can kill fish at very low concentrations. However, nickel has been found to be less toxic to some fish than copper, zinc, and iron. Nickel is present in coastal and open ocean water at concentrations in the range of 0.0001 to 0.006 mg/l although the most common values are 0.002 to 0.003 mg/l. Marine animals contain up to 0.4 mg/l and marine plants contain up to 3 mg/l. Higher nickel concentrations have been reported to cause reduction in photosynthetic activity of the giant kelp. A low concentration was found to kill oyster eggs.

For the protection of human health based on the toxic properties of nickel ingested through water and through contaminated aquatic organisms, the ambient water criterion is determined to be 0.0134 mg/l. If contaminated aquatic organisms are consumed, excluding consumption of water, the ambient water criterion is determined to be 0.100 mg/l. Available data show that adverse effects on aquatic life occur for total recoverable nickel concentrations as low as 0.0071 mg/l as a 24-hour average.

Nickel is not destroyed when treated in a POTW, but will either pass through to the POTW effluent or be retained in the POTW sludge. It can interfere with POTW treatment processes and can also limit the usefulness of municipal sludge.

Nickel salts have caused inhibition of the biochemical oxidation of sewage in a POTW. In a pilot plant, slug doses of nickel significantly reduced normal treatment efficiencies for a few hours, but the plant acclimated itself somewhat to the slug dosage and appeared to achieve normal treatment efficiencies within 40 hours. It has been reported that the anaerobic digestion process is inhibited only by high concentrations of nickel, while a low concentration of nickel inhibits the nitrification process.

The influent concentration of nickel to a POTW has been observed by the EPA to range from 0.01 to 3.19 mg/l, with a median of 0.33 mg/l. In a study of 190 POTW facilities, nickel pass-through was greater than 90 percent for 82 percent of the primary plants. Median pass-through for trickling filter, activated sludge, and biological process plants was greater than 80 percent. POTW effluent concentrations ranged from 0.002 to 40 mg/l (mean 0.410, standard deviation = 3.279). The most recent EPA study of the behavior of toxic pollutants in POTW indicates that nickel is 19 percent removed.

Nickel not passed through the POTW will be incorporated into the sludge. In a recent two-year study of eight cities, four of the cities had median nickel concentrations of over 350 mg/kg, and two were over 1,000 mg/kg. The maximum nickel concentration observed was 4,010 mg/kg.

Nickel is found in nearly all soils, plants, and waters. Nickel has no known essential function in plants. In soils, nickel typically is found in the range from 10 to 100 mg/kg. Various environmental exposures to nickel appear to correlate with increased incidence of tumors in man. For example, cancer in the maxillary antrum of snuff users may result from using plant materials grown on soil high in nickel.

Nickel toxicity may develop in plants from application of sewage sludge on acid soils. Nickel has caused reduction of yields for a variety of crops including oats, mustard, turnips, and cabbage. In one study nickel decreased the yields of oats significantly at 100 mg/kg.

Whether nickel exerts a toxic effect on plants depends on several soil factors, the amount of nickel applied, and the contents of other metals in the sludge. Unlike copper and zinc, which are more available from inorganic sources than from sludge, nickel uptake by plants seems to be promoted by the presence of the organic matter in sludge. Soil treatments, such as liming, reduce the solubility of nickel. Toxicity of nickel to plants is enhanced in acidic soils.

Selenium (125). Selenium (chemical symbol Se) is a non-metallic element existing in several allotropic forms. Gray selenium, which has a metallic appearance, is the stable form at ordinary temperatures and melts at 220C. Selenium is a major component of 38 minerals and a minor component of 37 others found in various parts of the world. Most selenium is obtained as a by-product of precious metals recovery from electrolytic copper refinery slimes. U.S. annual production at one time reached one million pounds.

Principal uses of selenium are in semi-conductors, pigments, decoloring of glass, zerography, and metallurgy. It also is used to produce ruby glass used in signal lights. Several selenium compounds are important oxidizing agents in the synthesis of organic chemicals and drug products.

While results of some studies suggest that selenium may be an essential element in human nutrition, the toxic effects of selenium in humans are well established. Lassitude, loss of hair, discoloration and loss of fingernails are symptoms of selenium poisoning. In a fatal case of ingestion of a larger dose of selenium acid, peripheral vascular collapse, pulmonary edema, and coma occurred. Selenium produces mutagenic and teratogenic effects, but it has not been established as exhibiting carcinogenic activity.

For the protection of human health from the toxic properties of selenium ingested through water and through contaminated aquatic organisms, the ambient water criterion is determined to be 0.010

mg/l, i.e., the same as the drinking water standard. Available data show that adverse effects on aquatic life occur at concentrations higher than that cited for human toxicity.

Very few data are available regarding the behavior of selenium in a POTW. One EPA survey of 103 POTW facilities revealed one POTW using biological treatment and having selenium in the influent. Influent concentration was 0.0025 mg/l, effluent concentration was 0.0016 mg/l, giving a removal of 37 percent. The most recent EPA study of the behavior of toxic pollutants in POTW indicates that selenium is 46 percent removed. It is not known to be inhibitory to POTW processes. In another study, sludge from POTW facilities in 16 cities was found to contain from 1.8 to 8.7 mg/kg selenium, compared to 0.01 to 2 mg/kg in untreated soil. These concentrations of selenium in sludge present a potential hazard for humans or other mammals eating crops grown on soil treated with selenium-containing sludge.

Silver (126). Silver is a soft, lustrous, white metal that is insoluble in water and alkali. In nature, silver is found in the elemental state (native silver) and combined in ores such as argentite (Ag_2S), horn silver ($AgCl$), proustite (Ag_3AsS_3), and pyrargyrite (Ag_3SbS_3). Silver is used extensively in several industries, among them electroplating.

Metallic silver is not considered to be toxic, but most of its salts are toxic to a large number of organisms. Upon ingestion by humans, many silver salts are absorbed in the circulatory system and deposited in various body tissues, resulting in generalized or sometimes localized gray pigmentation of the skin and mucous membranes known as argyria. There is no known method for removing silver from the tissues once it is deposited, and the effect is cumulative.

Silver is recognized as a bactericide and doses from 0.000001 to 0.0005 mg/l have been reported as sufficient to sterilize water. The criterion for ambient water to protect human health from the toxic properties of silver ingested through water and through contaminated aquatic organisms is 0.010 mg/l.

The chronic toxic effects of silver on the aquatic environment have not been given as much attention as many other heavy metals. Data from existing literature support the fact that silver is very toxic to aquatic organisms. Despite the fact that silver is nearly the most toxic of the heavy metals, there are insufficient data to adequately evaluate even the effects of hardness on silver toxicity. There are no data available on the toxicity of different forms of silver.

The most recent EPA study of the behavior of toxic pollutants in a POTW indicates that silver is 66 percent removed.

Bioaccumulation and concentration of silver from sewage sludge has not been studied to any great degree. There is some indication that silver could be bioaccumulated in mushrooms to the extent that there could be adverse physiological effects on humans if they consumed large quantities of mushrooms grown in silver enriched soil. The effect, however, would tend to be unpleasant rather than fatal.

There is little summary data available on the quantity of silver discharged to a POTW. Presumably there would be a tendency to limit its discharge from a manufacturing facility because of its high intrinsic value.

Thallium (127). Thallium (Tl) is a soft, silver-white, dense, malleable metal. Five major minerals contain 15 to 85 percent thallium, but they are not of commercial importance because the metal is produced in sufficient quantity as a by-product of lead-zinc smelting of sulfide ores. Thallium melts at 304C. U.S. annual production of thallium and its compounds is estimated to be 1,500 pounds.

Industrial uses of thallium include the manufacture of alloys, electronic devices and special glass. Thallium catalysts are used for industrial organic syntheses.

Acute thallium poisoning in humans has been widely described. Gastrointestinal pains and diarrhea are followed by abnormal sensation in the legs and arms, dizziness, and, later, loss of hair. The central nervous system is also affected. Somnolence, delerium or coma may occur. Studies on the teratogenicity of thallium appear inconclusive; no studies on mutagenicity were found; and no published reports on carcinogenicity of thallium were found.

For the protection of human health from the toxic properties of thallium ingested through water and contaminated aquatic organisms, the ambient water criterion is 0.013 mg/l.

No reports were found regarding the behavior of thallium in a POTW. It will not be degraded, therefore, it must pass through to the effluent or be removed with the sludge. However, since the sulfide (TlS) is very insoluble, if appreciable sulfide is present dissolved thallium in the influent to a POTW may be precipitated into the sludge. Subsequent use of sludge bearing thallium compounds as a soil amendment to crop bearing soils may result in uptake of this element by food plants. Several leafy garden crops (cabbage, lettuce, leek, and endive) exhibit relatively higher concentrations of thallium than other foods such as meat.

Zinc (128). Zinc occurs abundantly in the earth's crust, con centrated in ores. It is readily refined into the pure, stable, silver-white metal. In addition to its use in alloys, zinc is used as a protective coating on steel. It is applied by hot dipping (i.e., dipping the steel in molten zinc) or by electroplating.

Zinc can have an adverse effect on man and animals at high concentrations. Zinc at concentrations in excess of 5 mg/l causes an undesirable taste which persists through conventional treatment. For the prevention of adverse effects due to these organoleptic properties of zinc, 5 mg/l was adopted for the ambient water criterion. Available data show that adverse effects on aquatic life occur at concentrations as low as 0.047 mg/l as a 24-hour average.

Toxic concentrations of zinc compounds cause adverse changes in the morphology and physiology of fish. Lethal concentrations in the range of 0.1 mg/l have been reported. Acutely toxic concentrations induce cellular breakdown of the gills, and possibly the clogging of the gills with mucous. Chronically toxic concentrations of zinc compounds cause general enfeeblement and widespread histological changes to many organs, but not to gills. Abnormal swimming behavior has been reported at 0.04 mg/l. Growth and maturation are retarded by zinc. It has been observed that the effects of zinc poisoning may not become apparent immediately, so that fish removed from zinc-contaminated water may die as long as 48 hours after removal.

In general, salmonoids are most sensitive to elemental zinc in soft water; the rainbow trout is the most sensitive in hard waters. A complex relationship exists between zinc concentration, dissolved zinc concentration, pH, temperature, and calcium and magnesium concentration. Prediction of harmful effects has been less than reliable and controlled studies have not been extensively documented.

The major concern with zinc compounds in marine waters is not with acute lethal effects, but rather with the long-term sublethal effects of the metallic compounds and complexes. Zinc accumulates in some marine species, and marine animals contain zinc in the range of 6 to 1,500 mg/kg. From the point of view of acute lethal effects, invertebrate marine animals seem to be the most sensitive organism tested.

Toxicities of zinc in nutrient solutions have been demonstrated for a number of plants. A variety of fresh water plants tested manifested harmful symptoms at concentrations of 0.030 to 21.6 mg/l. Zinc sulfate has also been found to be lethal to many plants and it could impair agricultural uses of the water.

Zinc is not destroyed when treated by a POTW, but will either pass through to the POTW effluent or be retained in the POTW sludge. It can interfere with treatment processes in the POTW and can also limit the usefulness of municipal sludge.

In slug doses, and particularly in the presence of copper, dissolved zinc can interfere with or seriously disrupt the operation of POTW biological processes by reducing overall removal efficiencies, largely as a result of the toxicity of the metal to biological organisms. However, zinc solids in the form of hydroxides or sulfides do not appear to interfere with biological treatment processes, on the basis of available data. Such solids accumulate in the sludge.

The influent concentrations of zinc to a POTW has been observed by the EPA to range from 0.017 to 3.91 mg/l, with a median concentration of 0.33 mg/l. Primary treatment is not efficient in removing zinc; however, the microbial floc of secondary treatment readily adsorbs zinc.

In a study of 258 POTW facilities, the median pass-through values were 70 to 88 percent for primary plants, 50 to 60 percent for trickling filter and biological process plants, and 30 to 40 percent for activated process plants. POTW effluent concentrations of zinc ranged from 0.003 to 3.6 mg/l (mean = 0.330, standard deviation = 0.464). The most recent EPA study of the behavior of toxic pollutants in POTW indicates that zinc is 65 percent removed.

The zinc which does not pass through the POTW is retained in the sludge. The presence of zinc in sludge may limit its use on cropland. Sewage sludge contains 72 to over 30,000 mg/kg of zinc, with 3,366 mg/kg as the mean value. These concentrations are significantly greater than those normally found in soil, which range from 0 to 195 mg/kg, with 94 mg/kg being a common level. Therefore, application of sewage sludge to soil will generally increase the concentration of zinc in the soil. Zinc can be toxic to plants, depending upon soil pH. Lettuce, tomatoes, turnips, mustard, kale, and beets are especially sensitive to zinc contamination.

Oil and Grease. Oil and grease are taken together as one pollutant parameter. This is a conventional pollutant and some of its components are:

1. Light Hydrocarbons - These include light fuels such as gasoline, kerosene, and jet fuel, and miscellaneous solvents used for industrial processing, degreasing, or cleaning purposes. The presence of these light hydrocarbons may make the removal of other heavier oil wastes more difficult.

2. Heavy Hydrocarbons, Fuels, and Tars - These include the crude oils, diesel oils, #6 fuel oil, residual oils, slop oils, and in some cases, asphalt and road tar.

3. Lubricants and Cutting Fluids - These generally fall into two classes: non-emulsifiable oils such as lubricating oils and greases and emulsifiable oils such as water soluble oils, rolling oils, cutting oils, and drawing compounds. Emulsifiable oils may contain fat, soap, or various other additives.

4. Vegetable and Animal Fats and Oils - These originate primarily from processing of foods and natural products, but are sometimes used as metal forming lubricants.

These compounds can settle or float and may exist as solids or liquids depending upon factors such as method of use, production process, and temperature of water.

Oil and grease even in small quantities cause troublesome taste and odor problems. Scum lines from these agents are produced on water treatment basin walls and other containers. Fish and water fowl are adversely affected by oils in their habitat. Oil emulsions may adhere to the gills of fish causing suffocation, and the flesh of fish is tainted when microorganisms that were exposed to waste oil are eaten. Deposition of oil in the bottom sediments of water can serve to inhibit normal benthic growth. Oil and grease exhibit an oxygen demand.

Many of the toxic organic pollutants will be found distributed between the oil phase and the aqueous phase in industrial waste waters. The presence of phenols, PCB's, PAH's, and almost any other organic pollutant in the oil and grease make characterization of this parameter almost impossible. However, all of these other organics add to the objectionable nature of the oil and grease.

Levels of oil and grease which are toxic to aquatic organisms vary greatly, depending on the type and the species susceptibility. However, it has been reported that crude oil in concentrations as low as 0.3 mg/l is extremely toxic to freshwater fish. It has been recommended that public water supply sources be essentially free from oil and grease.

Oil and grease in quantities of 100 l/sq km show up as a sheen on the surface of a body of water. The presence of oil slicks decreases the aesthetic value of a waterway.

Oil and grease is compatible with a POTW activated sludge process in limited quantity. However, slug loadings or high concentrations of oil and grease interfere with biological treatment processes. The oils coat surfaces and solid particles, preventing access of oxygen, and sealing in some microorganisms. Land spreading of POTW sludge containing oil and grease uncontaminated by toxic pollutants is not expected to affect crops grown on the treated land, or animals eating those crops.

pH. Although not a specific pollutant, pH is related to the acidity or alkalinity of a wastewater stream. It is not, however, a measure of either. The term pH is used to describe the hydrogen ion concentration (or activity) present in a given solution. Values for pH range from 0 to 14, and these numbers are the negative logarithms of the hydrogen ion concentrations. A pH of 7 indicates neutrality. Solutions with a pH above 7 are alkaline, while those solutions with a pH below 7 are acidic. The relationship of pH and acidity and alkalinity is not necessarily linear or direct. Knowledge of the water pH is useful in determining necessary measures for corrosion control, sanitation, and disinfection. Its value is also necessary in the treatment of industrial wastewaters to determine amounts of chemicals required to remove pollutants and to measure their effectiveness. Removal of pollutants, especially dissolved solids is affected by the pH of the wastewater.

Waters with a pH below 6.0 are corrosive to water works structures, distribution lines, and household plumbing fixtures and can thus add constituents to drinking water such as iron, copper, zinc, cadmium, and lead. The hydrogen ion concentration can affect the taste of the water, and at a low pH water tastes sour. The bactericidal effect of chlorine is weakened as the pH increases, and it is advantageous to keep the pH close to 7.0. This is significant for providing safe drinking water.

Extremes of pH or rapid pH changes can exert stress conditiooons or kill aquatic life outright. Even moderate changes from acceptable criteria limits of pH are deleterious to some species.

The relative toxicity to aquatic life of many materials is increased by changes in the water pH. For example, metallocyanide complexes can increase a thousand-fold in toxicity with a drop of 1.5 pH units.

Because of the universal nature of pH and its effect on water quality and treatment, it is selected as a pollutant parameter for many industry categories. A neutral pH range (approximately 6 to 9) is generally desired because either extreme beyond this range has a deleterious effect on receiving waters or the pollutant nature of other wastewater constituents.

Pretreatment for regulation of pH is covered by the "General Pretreatment Regulations for Existing and New Sources of Pollution," 40 CFR 403.5. This section prohibits the discharge to a POTW of "pollutants which will cause corrosive structural damage to the POTW but in no case discharges with pH lower than 5.0 unless the works is specially designed to accommodate such discharges."

Total Suspended Solids (TSS). Suspended solids include both organic and inorganic materials. The inorganic compounds include sand, silt, and clay. The organic fraction includes such materials as grease, oil, tar, and animal and vegetable waste products. These solids may settle out rapidly, and bottom deposits are often a mixture of both organic and inorganic solids. Solids may be suspended in water for a time and then settle to the bed of the stream or lake. These solids discharged with man's wastes may be inert, slowly biodegradable materials, or rapidly decomposable substances. While in suspension, suspended solids increase the turbidity of the water, reduce light penetration, and impair the photosynthetic activity of aquatic plants.

Suspended solids in water interfere with many industrial processes and cause foaming in boilers and incrustations on equipment exposed to such water, especially as the temperature rises. They are undesirable in process water used in the manufacture of steel, in the textile industry, in laundries, in dyeing, and in cooling systems.

Solids in suspension are aesthetically displeasing. When they settle to form sludge deposits on the stream or lake bed, they are often damaging to the life in the water. Solids, when transformed to sludge deposit, may do a variety of damaging things, including blanketing the stream or lake bed and thereby destroying the living spaces for those benthic organisms that would otherwise occupy the habitat. When of an organic nature, solids use a portion or all of the dissolved oxygen available in the area. Organic materials also serve as a food source for sludgeworms and associated organisms.

Disregarding any toxic effect attributable to substances leached out by water, suspended solids may kill fish and shellfish by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids are inimical to aquatic life because they screen out light, and they promote and maintain the development of noxious conditions through oxygen depletion. This results in the killing of fish and fish food organisms. Suspended solids also reduce the recreational value of the water.

Total suspended solids is a traditional pollutant which is compatible with a well-run POTW. This pollutant with the exception of those components which are described elsewhere in this section, e.g., heavy metal components, does not interfere with the operation of a POTW. However, since a considerable portion of the innocuous TSS may be inseparably bound to the constituents which do interfere with POTW operation, or produce unusable sludge, or subsequently dissolve to produce unacceptable POTW effluent, TSS may be considered a toxic waste.

Aluminum (Al). Aluminum, a nonconventional pollutant, is the most common metallic element in the earth's crust, and the third most abundant element (8.1 percent). It is never found free in nature. Most rocks and various clays contain aluminum in the form of aluminosilicate minerals. Generally, aluminum is first converted to alumina (Al_2O_3) from bauxite ore. The alumina then undergoes electrolytic reduction to form the metal. Aluminum powders (used in explosives, fireworks, and rocket fuels) form flammable mixtures in the air. Aluminum metal resists corrosion under many conditions by forming a protective oxide film on the surface. This oxide layer corrodes rapidly in strong acids and alkalis, and by the electrolytic action of other metals with which it comes in contact. Aluminum is light, malleable, ductile, possesses high thermal and electrical conductivity, and is non-magnetic. It can be formed, machined, or cast. Aluminum is used in the building and construction, transportation, and the container and packaging industries and competes with iron and steel in these markets.

Aluminum is soluble under both acidic and basic conditions, with environmental transport occurring most readily under these conditions. In water, aluminum can behave as an acid or base, can form ionic complexes with other substances, and can polymerize, depending on pH and the dissolved substances in water. Aluminum's high solubility at acidic pH conditions makes it readily available for accumulation in aquatic life. Acidic waters consistently contain higher levels of soluble aluminum than neutral or alkaline waters. Loss of aquatic life in acidified lakes and streams has been shown to be due in part to increased concentrations of aluminum in waters as a result of leaching of aluminum from soil by acidic rainfall.

Aluminum has been found to be toxic to freshwater and marine aquatic life. In freshwaters acute toxicity and solubility increases as pH levels increase above pH 7. This relationship also appears to be true as the pH levels decrease below pH 7. Chronic effects of aluminum on aquatic life have also been documented. Aluminum has been found to be toxic to certain plants. A water quality standard for aluminum was established (U.S. Federal Water Pollution Control Administration, 1968) for interstate agricultural and irrigation waters, which set a trace element tolerance at 1 mg/l for continuous use on all soils and 20 mg/l for short term use on fine-textured soils.

There are no reported adverse physiological effects on man from exposure to low concentrations of aluminum in drinking water. Large concentrations of aluminum in the human body, however, are alleged to cause changes in behavior. Aluminum compounds, especially aluminum sulfate, are major coagulants used in the treatment of drinking water. Aluminum is not among the metals for which a drinking water standard has been established.

The highest aluminum concentrations in animals and humans occur in the lungs, mostly from the inhalation of airborne particulate matter. Pulmonary fibrosis has been associated with the inhalation of very fine particles of aluminum flakes and powders among workers in the explosives and fireworks industries. An occupational exposure Threshold Limit Value (TLV) of 5 mg/m^3 is recommended for pyro powders to prevent lung changes, and a Time-Weighted Average (TWA) of 10 mg/m^3 is recommended for aluminum dust. High levels of aluminum have been found in the brains, muscles, and bones of patients with chronic renal failure who are being treated with aluminum hydroxide, and high brain levels of aluminum are found in those suffering from Alzheimers disease (presenile dementia) which manifests behavioral changes.

Aluminum and some of its compounds used in food preparation and as food additives are generally recognized as safe and are sanctioned by the Food and Drug Administration. No limits on aluminum content in food and beverage products have been established.

Aluminum has no adverse effects on POTW operation at concentrations normally encountered. The results of an EPA study of 50 POTW revealed that 49 POTW contained aluminum with effluent concentrations ranging from less than 0.1 mg/l to 1.07 mg/l and with an average removal of 82 percent.

Ammonia. Ammonia (chemical formula NH_3) is a nonconventional pollutant. It is a colorless gas with a very pungent odor, detectable at concentrations of 20 ppm in air by the nose, and is very soluble in water (570 gm/l at 25C). Ammonia is produced industrially in very large quantities (nearly 20 million tons annually in the U.S.). It is converted to ammonium compounds or shipped in the liquid form (it liquifies at -33C). Ammonia also results from natural processes. Bacterial action on nitrates or nitrites, as well as dead plant and animal tissue and animal wastes produces ammonia. Typical domestic wastewaters contain 12 to 50 mg/l ammonia.

The principal use of ammonia and its compounds is as fertilizer. High amounts are introduced into soils and the water runoff from agricultural land by this use. Smaller quantities of ammonia are used as a refrigerant. Aqueous ammonia (2 to 5 percent solution) is widely used as a household cleaner. Ammonium compounds find a variety of uses in various industries, as an example, ammonium hydroxide is used as a reactant in the purification of tungsten.

Ammonia is toxic to humans by inhalation of the gas or ingestion of aqueous solutions. The ionized form, ammonium (NH_4+), is less toxic than the unionized form. Ingestion of as little as one ounce of household ammonia has been reported as a fatal dose. Whether inhaled or ingested, ammonia acts destructively on mucous membrane with resulting loss of function. Aside from breaks in liquid ammonia refrigeration equipment, industrial hazard from ammonia exists where solutions of ammonium compounds may be accidently treated with a strong alkali, releasing ammonia gas. As little as 150 ppm ammonia in air is reported to cause laryngeal spasms, and inhalation of 5,000 ppm in air is considered sufficient to result in death.

The behavior of ammonia in POTW is well documented because it is a natural component of domestic wastewaters. Only very high concentrations of ammonia compounds could overload POTW. One study has shown that concentrations of unionized ammonia greater than 90 mg/l reduce gasification in anaerobic digesters and concentrations of 140 mg/l stop digestion completely. Corrosion of copper piping and excessive consumption of chlorine also result from high ammonia concentrations. Interference with aerobic nitrification processes can occur when large concentrations of ammonia suppress dissolved oxygen. Nitrites are then produced instead of nitrates. Elevated nitrite concentrations in drinking water are known to cause infant methemoglobinemia.

Cobalt (Co). Cobalt is a nonconventional pollutant. It is a brittle, hard, magnetic, gray metal with a reddish tinge. Cobalt ores are usually the sulfide or arsenic [smaltrite-(Co, Ni)As_2; cobaltite-CoAsS] and are sparingly distributed in the earth's crust. Cobalt is usually produced as a by-product of mining copper, nickel, arsenic, iron manganese, or silver. Because of the variety of ores and the very low concentrations of cobalt, recovery of the metal is accomplished by several different processes. Most consumption of cobalt is for alloys.

Over two-thirds of U.S. production goes to heat resistant, magnetic, and wear resistant alloys. Chemicals and color pigments make up most of the rest of consumption.

Cobalt and many of its alloys are not corrosion resistant, therefore, minor corrosion of any of the tool alloys or electrical resistance alloys can contribute to its presence in raw wastewater from a variety of manufacturing facilities. Additionally, the use of cobalt soaps used in coatings may be a general source of small quantities of the metal. Several cobalt pigments are used in paints to produce yellows or blues.

Cobalt is an essential nutrient for humans and other mammals, and is present at a fairly constant level of about 1.2 mg in the adult human body. Mammals tolerate low levels of ingested water-soluble cobalt salts without any toxic symptoms; safe dosage levels in man have been stated to be 2-7 mg/kg body weight per day. A goitrogenic effect in humans is observed after the systematic administration of 3-4 mg cobalt as cobaltous chloride daily for three weeks. Fatal heart disease among heavy beer drinkers was attributed to the cardiotoxic action of cobalt salts which were formerly used as additives to improve foaming. The carcinogenicity of cobalt in rats has been verified, however, there is no evidence for the involvement of dietary cobalt in carcinogenisis in mammals.

There are no data available on the behavior of cobalt in POTW. There are no data to lead to an expectation of adverse effects of cobalt on POTW operation or the utility of sludge from POTW for crop application. Cobalt which enters POTW is expected to pass through to the effluent unless sufficient sulfide ion is present, or generated in anaerobic processes in the POTW to cause precipitation of the very insoluble cobalt sulfide.

Fluoride. Fluoride ion (F^-) is a nonconventional pollutant. Fluorine is an extremely reactive, pale yellow, gas which is never found free in nature. Compounds of fluorine - fluorides - are found widely distributed in nature. The principal minerals containing fluorine are fluorspar (CaF_2) and cryolite (Na_2AlF_6). Although fluorine is produced commercially in small quantities by electrolysis of potassium bifluoride in anhydrous hydrogen fluoride, the elemental form bears little relation to the combined ion. Total production of fluoride chemicals in the U.S. is difficult to estimate because of the varied uses. Large volume usage compounds are: calcium fluoride (estimated 1,500,000 tons in U.S.) and sodium fluoraluminate (estimated 100,000 tons in U.S.). Some fluoride compounds and their uses are sodium fluoroaluminate - aluminum production; calcium fluoride - steelmaking, hydrofluoric acid production, enamel, iron foundry; boron trifluoride - organic synthesis; antimony pentafluoride - fluorocarbon production; fluoboric acid and fluoborates - electroplating; perchloryl fluoride (ClO_3F) - rocket fuel oxidizer; hydrogen fluoride - organic fluoride manufacture, pickling acid in stainless steelmaking, manufacture of aluminum fluoride; sulfur hexafluoride - insulator in high voltage transformers; polytetrafluoroethylene - inert plastic. Sodium fluoride is used at a concentration of about 1 pm in many public drinking water supplies to prevent tooth decay in children.

The toxic effects of fluoride on humans include severe gastroenteritis, vomiting, diarrhea, spasms, weakness, thirst, failing pulse and delayed blood coagulation. Most observations of toxic effects are made on individuals who intentionally or accidentally ingest sodium fluoride intended for use as rat poison or insecticide. Lethal does for adults are estimated to be as low as 2.5 g. At 1.5 ppm in drinking water, mottling of tooth enamel is reported, and 14 ppm, consumed over a period of years, may lead to deposition of calcium fluoride in bone and tendons.

Fluorides found in irrigation waters in high concentrations have caused damage to certain plants exposed to these waters. Chronic fluoride poisoning of livestock has been observed. Fluoride from waters apparently does not accumulate in soft tissue to a significant degree; it is transferred to a very small extent into the milk and to a somewhat greater degree in eggs. Data for fresh water indicate that fluorides are toxic to fish.

Very few data are available on the behavior of fluoride in POTW. Under usual operating conditions in POTW, fluorides pass through into the effluent. Very little of the fluoride entering conventional primary and secondary treatment processes is removed. In one study of POTW influents conducted by the U.S. EPA, nine POTW reported concentrations of fluoride ranging from 0.7 mg/l to 1.2 mg/l, which is the range of concentrations used for fluoridated drinking water.

Gold (Au). The oldest and principle use of gold is in jewelry. Gold is chemically inert toward most substances, and does not tarnish or corrode in use. It is the most malleable of metals, has a bright pleasing color, alloys readily with common metals and has high electrical and thermal conductivity. Thus in jewelry, gold is nonallergenic, remains tarnish free indefinitely and is relatively easy to fashion. For many of the same reasons gold is used in dentistry, in inlays, crowns, bridges, and orthodontic appliances. Strategic and industrial uses of gold include electronic devices particularly printed circuit boards, connectors, keyboard contactors, and miniaturized circuitry. Instead of gold plating an entire device, the electronics industry has developed a selected-area plating process or make contact point from gold inlay and other types of bimetallic strip.

Gold is widely distributed in nature, occuring in trace quantities in several ores, and sea water. The pure metal is extremely inactive, and insoluble in water, thus gold ions are unlikely to be found in natural waters.

One study has shown gold ions to be lethal to the stickleback at

0.40 mg/l. Gold injections have been used to treat arthritis in humans, with apparently little toxic effect.

Iron (Fe). Iron is a nonconventional pollutant. It is an abundant metal found at many places in the earth's crust. The most common iron ore is hematite (Fe_2O_3) from which iron is obtained by reduction with carbon. Other forms of commercial ores are magnetite (Fe_3O_4) and taconite (FeSiO). Pure iron is not often found in commercial use, but it is usually alloyed with other metals and minerals. The most common of these is carbon.

Iron is the basic element in the production of steel. Iron with carbon is used for casting of major parts of machines and it can be machined, cast, formed, and welded. Ferrous iron is used in paints, while powdered iron can be sintered and used in powder metallurgy. Iron compounds are also used to precipitate other metals and undesirable minerals from industrial wastewater streams.

Corrosion products of iron in water cause staining of porcelain fixtures, and ferric iron combines with tannin to produce a dark violet color. The presence of excessive iron in water discourages cows from drinking and thus reduces milk production. High concentrations of ferric and ferrous ions in water kill most fish introduced to the solution within a few hours. The killing action is attributed to coatings of iron hydroxide precipitates on the gills. Iron oxidizing bacteria are dependent on iron in water for growth. These bacteria form slimes that can affect the aesthetic values of bodies of water and cause stoppage of flows in pipes. However, high concentrations of iron can precipitate on bottom sediments and affect rooted aquatic and invertebrate benthos.

Iron is an essential nutrient and micro-nutrient for all forms of growth. Drinking water standards in the U.S. set a limit of 0.3 mg/l of iron in domestic water supplies based on aesthetic and organoleptic properties of iron in water.

High concentrations of iron do not pass through a POTW into the effluent. In some POTW iron salts are added to coagulate precipitates and suspended sediments into a sludge. In an EPA study of POTW the concentration of iron in the effluent of 22 biological POTW meeting secondary treatment performance levels ranged from 0.048 to 0.569 mg/l with a median value of 0.25 mg/l. This represented removals of 76 to 97 percent with a median of 87 percent removal.

Iron in sewage sludge spread on land used for agricultural purposes is not expected to have a detrimental effect on crops grown on the land.

Magnesium (Mg). Magnesium is the eighth most abundant element in the earth's crust and third most plentiful element dissolved in seawater with an average concentration of 1,300 mg/l. Magnesium salts tend to be very soluble; for example magnesium carbonate will dissolve as much as 100 to 300 mg/l at 20C. At a pH 7 magnesium ions can be solubilized in water as much as 28,800 gram/l. Magnesium ions occur in significant concentration in natural waters, and along with calcium form the bulk of the hardness reaction.

Of the many magnesium-bearing ores, dolomite ($CaCO_3 \cdot MgCO_3$), magnesite ($MgCO_3$) brucite ($Mg(OH)_2$) and olivine ($Mg_2Fe_2SiO_4$) are the only ones used commerically to produce magensium metal. Magnesium metal and compounds are also prepared from seawaters, brines and bitterns. Dolomite, seawater and brines are widely distributed throughout the world.

Magnesium metal is produced by one of two techniques; electrolytically with a silicothermic process. Seawater or brine is the primary feed material for the electrolytic process. Hydrous magnesium chloride is produced by reacting dolomite with seawater to precipitate dissolved magnesium as magnesium hydroxide and then neutralizing with hydrochlric acid. The resulting solution is dehydrated to produce a dust which is used as feed for the electrolytic cells. Hydrous or anbydrous magnesium chloride is fed to an electrolytic cell containing molten magnesium choride at 1,292F. Graphite rods are the electrodes and steel rod the cathodes. Direct current breaks down magensium chloride releasing chlorine gas and molten magensium. The metal is formed at the cathode and rises to the surface.

Magnesium and its alloys can be cast by sand, die, and permanent mold processes using conventional foundry techniques, it can be extruded rolled drawn and forged at elevated temperatures ranging from 400 to 750F. Magnesium and its alloys are the easiest of the structural metals to machine. They can be joined by brazing, riveting, soldering, and adhesive bonding.

Of the magnesium consumed in the U.S., 85 percent is used in magnesium compounds, the remainder is used as metal. Its major use as a metal is an alloying agent in aluminum alloys. Magnesium metal is used in the auto manufacturing and power tool manufacturing. It is also used as a catalyst for producing organic chemicals and petrochemicals and as a reducing agent for producing other nonferrous metals.

Magnesium is considered relatively non-toxic to man; before toxic concentrations are reached it causes an unpleasant taste in water. Magnesium at high concentration has a laxative effect. Magnesium is essential to normal plant growth; however in very high concentrations (3000-5000 mg/l) $MgCl_2$ and $MgSO_4$ have been toxic to the bean plant.

Animals require magnesium salts in their diet; however, high doses of magnesium act as diurectics and cathartics among animals and may cause scouring diseases among stock. The relative concentrations of magnesium and calcium in water may be one

...ctor controlling the distribution of certain crustacean fish food organisms, such as copepods, in streams. Magnesium chloride and nitrate can be toxic to fish in distilled or tap water at concentrations between 100 and 400 mg/l as magnesium.

Molybdenum (Mo). Molybdenum is present in the environment in trace quantities. It is estimated that 3.6 x 10^{10} grams of molybdenum are released into surface waters of the world each year by natural processes. Most surface waters contain less than 0.02 mg/l of molybdenum, and sea water concentrations range from 0.004 to 0.012 mg/l. Finished waters in the United States contain a median of 0.0014 mg/l of molybdenum and a maximum of 0.068 mg/l. Normal concentrations in stream sediments range from 1 to 5 ppm and the concentration of molybdenum tends to increase with decreasing grain size.

Molybdenum is vitally necessary to plants and animals as it is a constituent of essential enzymes needed for life processes. Molybdenum concentrations in plants normally range from 1 to 2 mg/l, though a range of tenths to hundredths of ppm have been observed. Legumes tend to take up more molybdenum than other plants. Accumulation of molybdenum in plants occurs without detrimental effects.

Disease related to molybdenum in humans and animals has historically been a result of excessive uptake of molybdenum.

Average daily intake of molybdenum in the United States varies between 0.12 and 0.24 mg/day, depending on age, sex, and family income. Estimated daily intake of molybdenum in the U.S.S.R. has been reported to be between 0.329 to 0.376 mg/day. Abnormally high intakes, as high as 10 to 15 mg/day, have been documented in India, the U.S.S.R., and are suspected in Turkey. Diet plays a large part in determining molybdenum uptake. Legumes, cereal grains, leafy vegetables, liver, and kidney beans are among the foods which contain greater concentrations of molybdenum than fruits, root and stem vegetables, muscle meats, and dairy products.

The only clinical symptom resulting from excessive molybdenum uptake in humans is described as a gout-like disease. Study of a human population receiving 10 to 15 mg/day of molybdenum found high incidence of this gout-like disease. In addition, increased uric acid levels were noted. Another study where humans were exposed to 10 mg/day found greatly increased blood and urine levels of molybdenum, and significant increases in uric acid excretion, though the levels of uric acid were still within an acceptable range for humans. For daily intake levels between 0.5 and 1.0 mg of molybdenum, increased urinary copper excretion was noted in human subjects. Increased urinary excretion of molybdenum has been observed in humans whose water supply contained 0.05 to 0.2 mg/l No biochemical or clinical effects are known in humans whose water supply contains less than 0.05 mg/l of molybdenum.

Sources of molybdenum for animals are primarily in pasture forage and grain feed. Intake from water sources is not very significant. Molybdenum is more toxic to animals than to humans, and cattle and sheep are more susceptible to disease caused by excessive molybdenum than rats, poultry, horses, and pigs. These species differences are not understood. The Registry of Toxic Effects of Chemical Substances states the lower toxic dose (oral) for rats and rodents is 6.050 mg/kg.

All cattle are susceptible to molybdenosis, with dairy cattle and calves showing a higher susceptibility. The characteristic scouring disease and weight loss may be debilitating to the point of permanent injury or death. Pastures containing 20 to 100 ppm of molybdenum (dry weight basis) are likely to induce the disease as compared to health forage containing 3 to 5 ppm molybdenum or less. It is difficult to assign a firm threshold value of molybdenum contained in pasture that will include molybdenosis because of the effects of two other dietary constituents. High levels of molybdenum act to decrease the retention of copper in an animal. Increased copper intake could, therefore, mitigate the effect of high amounts of molybdenum. The second factor in the diet is sulfate. It has been shown that in animals showing increasing levels of molybdenum, an increase in dietary sulfate causes more of the molybdenum to be excreted harmlessly.

A study of the effects on frogs to changes in the molybdenum concentration in the aqueous environment concluded that while high concentrations of aqueous molybdenum increased blood levels of molybdenum in frogs, no deleterious effects were observed. Laboratory bioassays involving rainbow trout have also been conducted to determine long-term and acute toxicity of molybdenum. Long-term toxicity tests included sodium molybdate dissolved in demineralized water in concentrations ranging from 0 to 17 mg/l molybdenum. After one year, results showed no significant differences in growth and mortality for the exposed fish. Acute toxicity results determined that for rainbow trout averaging 55 mm and 20 mm, and 96 hr LC50 is 1,320 mg/l molydenum and 800 mg/l respectively. Studies performed on immature rainbow trout using continuous exposure to molybdenum from fertilization through 4 day after hatching produced an LC50 value of 0.79 mg/l.

A third study was done to determine whether or not molybdenum mining in Colorado was causing any environmental problems to the natural wildlife in geographic areas impacted by molybdenum mining and milling. Animals in the area were assayed, fish were placed a mile downstream of mine tailings, and tailings were fed to chicks. No serious adverse effects were discovered in animals, and chicks fed 20 percent mine tailings remained healthy. Some adverse effects and abnormal tissue were found in the fish, but it was not certain whether these conditions were caused by excessive molybdenum or other heavy metals also present in the stream.

Molybdenum is not very toxic to humans. Clinical effects have been reported at steady intake levels of 10 to 15 mg/day of molybdenum, and biochemical effects in the range of 0.5 to 10 mg/day. Below 0.5 mg/day, there is no evidence of substantial toxic effects of molybdenum to humans.

The greatest problem of molybdenum toxicity .volves cattle and other ruminants. These animals are for unknown reasons particularly susceptible to molybdenosis, and in addition, rely entirely on forage for food. It is known that plants can accumulate molybdenum without harmful effects, but herbage containing more than 20 ppm (dry weight basis) may cause molybdenosis in cattle.

High molybdenum content in surface waters in the United States is rare and usually associated with molybdenum mining and milling, uranium mining and milling, copper mining and milling, molybdenum smelting and purification, or shale oil production. Toxicity of molybdenum to some aquatic life has been shown to be low. Surface or ground waters high in molybdenum that are used for farmland irrigation may increase molybdenum content of plants. This may have effects on animals further along the food chain.

Tantalum (Ta). Tantalum is a nonconventional pollutant. It occurs in a number of oxide minerals which almost invariably contain columbium. Tantalum does not occur naturally in the free state. The manufacture of tantalum metal is accomplished by extraction of tantalum from the ore or tin slag, separation of the extract of tantalum from other metals present, formation of a pure tantalum compound fluorotantalate, and reduction of the compound to metal powder.

Most of the world's resources of tantalum occr outside the United States. The U.S. consumes usually 60 percent of the tantalum produced worldwide. The relatively small amount of tantalum in the earth's crust and low concentrations in known deposits keep the cost of concentrates quite high. The presence of a naturally occuring oxide film on the surface of tantalum makes it resistant to corrosion in most severe acid environments and to many other chemicals encountered in industrial applications. About 60 percent of the world's annual production of tantalum is used in capacitors, because of the metals ability to form the stable dielectric oxide surface film; 27 percent is used as the carbide, TaC, in cemented carbide cutting tools.

Pure tantalum is soluble in fused alkalies. It is insoluble in acids except hydrofluoric and fuming sulfuric. Tantalum oxide, a compound used in intermediate preparation of pure tantalum, is slightly soluble in cold water and quite soluble in hot water.

Tantalum is inert and does not appear to have detrimental affects on the human body, when used in surgical implants. Tantalum powder, however, is moderately toxic by inhalation. It has been suspected of causing skin irratation and mild fibrosis of the lungs. The recommended threshold limit value (TLV) reported by

OSHA for exposure in workroom air is 5.0 mg/m^3 of air.

In the aquatic environment, tantalum is found to cause chronic effects (as determined by embyro-larval bioassays on rainbow trout) at levels of 0.094 mg/l. Tantalum has been found to cause tumorigenic activity when implanted in rats at levels of 3760 mg/kg.

Tin (Sn). Tin is a nonconventional pollutant. This metallic element occurs in the earth's crust to the extent of 40 grams per metric ton. It is present in the form of nine different minerals from two types of deposits: the most commercially significant ore cassiterite, SnO_2; and the complex sulfidic ores which are combinations with the sulfides of base metals and pyrites.

Tin is obtained by roasting the ore (cassiterite) to oxidize sulfates and to remove arsine, then reducing with coal in a reverberatory furnace, or by smelting in an electric furnace. The crude tin obtained from slags and by smelting ore concentrates is refined by further heat treatment, or sometimes electrolytic processes. The conventional heat treatment refining includes liquidation or sweating and boiling, or tossing.

In 1980, greater than 14,700 metric tons of tin were recovered in the United States from scrap. Sources include bronze rejects and used parts, solder in the form of dross or sweepings, dross from tinning pots, sludges from tinning lines, and babbitt from discarded bearings.

Tin is used in various industrial applications as cast and wrought forms obtained by rolling, drawing, extrusion, atomizing, and casting. Its uses include tin plate, terneplate, babbitt metal, pewter bronze, corrosion resistant coatings, collapsible tubes, anodes for electrotin plating, and hot-dipped coatings.

Tin is soluble in acids and hot potassium hydroxide solution. It is insoluble in water. Test have shown that considerable quantities of tin can be consumed without any effect on the human system. Small amounts of tin are present in most liquid canned products. The permitted limit of tin content in foods is 300 mg/kg in the United States. The OSHA standard for pulmonary exposure specifies a threshold limit value (TLV) of 2 mg tin per m^3.

Elemental tin has low toxicity, but most of its compounds are toxic. Lethal oral doses (LD50) of stannous chloride of 700 mg/kg and 1200 mg/kg for rats and mice have been reported. Stannous chloride is soluble in cold water and decomposes in hot water and a concentration of 0.019 mg/l has been reported to cause chronic effects on rainbow trout embryos.

Titanium (Ti). Titanium is a nonconventional pollutant. It is a lustrous white metal occurring as the oxide in ilmenite ($FeO \cdot TiO_2$) and rutile (TiO_2). The metal is used in heat-resistant, high-strength, light-weight alloys for aircraft and missiles. It is also used in surgical appliances because of its high strength and light weight. Titanium dioxide is used extensively as a white pigment in paints, ceramics, and plastics.

Toxicity data on titanium are not abundant. Because of the lack of definitive data titanium compounds are generally considered non-toxic. Large oral doses of titanium dioxide (TiO_2) and thiotitanic acid (H_4TiSO_3) were tolerated by rabbits for several days with no toxic symptoms. However, impaired reproductive capacity was observed in rats fed 5 mg/l titanium as titanite in drinking water. There was also a reduction in the male/female ratio and in the number of animals surviving to the third generation. Titanium compounds are reported to inhibit several enzyme systems and to be carcinogenic.

The behavior of titanium in POTW has not been studied. On the basis of the insolubility of the titanium oxides in water, it is expected that most of the titanium entering the POTW will be removed by settling and will remain in the sludge. No data were found regarding possible effects on plants as a result of spreading titanium-containing sludge on agricultural cropland.

Tungsten (W). Tungsten, a nonconventional pollutant, is the eighteenth most abundant metal, making up between 1 to 1.3 ppm of the earth's crust. In nature it exists primarily as tungsten trioxide in the form of ferberite, huebnerite, wolframite, and scheelite ores. These ores contain low concentrations of tungsten trioxide and must be concentrated via benefication before further processing. Seventy-five percent of the worlds tungsten deposits are located in the People's Republic of China. However, ninety-five percent of tungsten used in the U. S. comes from domestic sources. In 1980 thirty-five hundred tons of tungsten was produced at a value of sixty million dollars. Up to seventeen percent of tungsten produced has been recycled in past years.

In pure form tungsten is a hard, brittele silver-gray metallic element with very high electrical and thermal conductivity. Tungsten is resistant to extreme heat, as well as many chemicals. Only a mix of hydrofluoric and nitric acids will rapidly attack tungsten at room temperature. Sulfuric and phosphoric acids have little effect. Tungsten is weakly magnetic.

Most tungsten uses require a pure form. This is usually achieved by an extractive metallurgical process called Ammonium Paratungstate (APT) Conversion. This process converts tungsten trioxide to an intermediate form (APT) which can be reduced to a pure metal powder. Sixty-five percent of tungsten goes to tungsten carbide production. Tungsten carbide is used for high hardness, heat resistant tools, such as cutting and drilling tools, bearings, etc. Sixteen percent of tungsten is used as an alloying additive. In these processes, tungsten trioxide concentrates are used instead of pure tungsten to produce high temperature resistant steel for hot work tools. Ten percent of metallic tungsten is used to produce lamp filaments, X-ray targets, heat shields, and glass melting equipment. Tungsten compounds are often used as industrial and oil refining catalysts.

In the tungsten carbide industry many cases of pneumonia have been noted. It is believed that these incidences are related to other chemicals and metals used in the manufacturing process. Tungsten and tungsten ores alone seem to have little or no toxic effects upon humans. Some tungsten compounds have created acute and chronic toxic effects on test animals. The most toxic tungsten compound is sodium tungstate. Recommended exposure limits (TWA & TLV) have been set equally at 5.0 mg/m^3 as tungsten.

In one study using rainbow trout embryos, tungsten was found to cause chronic, sub-lethal effects at levels of 1.066 mg/l.

Uranium (U). Uranium, a nonconventional pollutant, is a member of the actinide series of transition elements. It is present in the earth's crust at approximately 2 ppm. Ninety percent of the world's known uranium resources are contained in conglomerates and in sandstone. The methods used to extract uranium resources from ores vary widely, and composition is only one of several factors affecting the choice. Methods performed are crushing and grinding, roasting and calcining, preconcentration, and leaching. The resulting pure uranium is a dense, lustrous metal resembling iron; it is ductile and malleable. In air it tarnishes rapidly, and in a short time, even a polished surface becomes coated with a dark-colored layer of oxide. Uranium is attacked by water, acids and peroxides, but is inert toward alkalies.

The largest use of uranium is as a fuel in nuclear power reactors. Uranium provides a source of fissionable isotope 235 and plutonium by neutron capture. It is also used in inertial guidance devices, gyro compasses, as a counter-weight for missle re-entry vehicles, shielding material, and X-ray targets.

Uranium is found in both food and drinking water. The uranium content of most foods is in the range of 10-100 ng/g and the average intake of uranium in food is about 0.001 mg/day. The opportunity for ingesting uranium in drinking water usually exceeds that for food. The surface and ground water supplies identified as domestic water sources have a range of 0.00015-0.980 mg/l. EPA's Office of Drinking Water is considering proposing a health effects guidance level of 10 pCi/l (0.015 mg/l, assuming equilibrium of three uranium isotopes) for uranium in drinking water.

The toxicity of uranium caused by its radiation depends on the isotopes present. Such isotopes as 232U, which emits a fairly strong alpha radiation should be handled in a hot cell, others should be manipulated in a glove box.

Uranium is not only toxic because of its radiation, but it is also chemically toxic. Nephritis is the primary chemicallyinduced health effect of uranium in animals and humans. LD50 values of 40-297 mg/kg body weight for male rats have been reported. The "no observed effect" level of 0.1 mg/kg has been derived from both human and animal data for one time only ingestions. There are no chronic studies of animals or humans at low levels for the ingestion of uranium.

The toxicity of uranium compounds varies. Uranium compounds may be ingested, inhaled, or absorbed through the skin. In acute uranium poisoning, kidney lesions, internal hemorrhage, and liver-cell changes were observed. Standard laboratory protective measures against chemical poisoning by uranium are mandatory, e.g., no pipetting by the mouth; protective clothing; surgical gloves; and in operations involving dust formation, face mask, and constant ventilation of working areas. The OSHA standard for pulmonary exposure specifies a threhold limit value (TLV) of 0.2 mg/m3.

There is little data on the toxic effects of uranium on aquatic life. In one study uranium was found to bioconcentrate in bottom feeding fish at levels much higher than other types of fish.

Vanadium (V). Vanadium, a transition metal, is a nonconventional pollutant. It makes up 0.07 percent of the lithosphere by weight and is ranked twenty-second for elemental abundance in the earth's crust. Usable world resources are estimated to exceed 120 billion tons in the form of vanadium ores found in deposits of titaniferous magnetite, phosphate ores, uranium ores, and petroliferous material. Most vanadium ores are obtained as a by-product of these larger scale mining operations. Vanadium ores are generally salt-roasted to obtain 86 percent pure vanadium pentoxide in a red cake which can be further processed by calcium reduction to obtain 99.5 percent pure vanadium metal. In 1980, 5050 tons of vanadium was produced in the United States, and this number is expected to grow as industrial, transportation, and high technology needs expand.

Pure vanadium is a silver-white solid that is corrosion resistant, insoluble in water and alkali solutions, and soluble in nitric, hydrofluoric, and concentrated sulfuric acid. The elemental form of vanadium is soft and ductile, yet susceptible to hydrogen, nitrogen, oxygen, and carbon embrittlement. The pure metal has relatively high thermal and electrical conductivity, and is paramagnetic. Pentavalent vanadium (vanadium pentoxide) is an amphoteric substance slightly soluble in water, and soluble in acid and alkali solutions.

The major end uses of vanadium are in the areas of transportation, machinery, and construction, where vanadium alloyed steel is used. Using vanadium as an alloying agent yields a very desirable ferrous alloy with greater toughness, impact resistance, wear resistance, weldability, and heat resistance. Because of these qualities vanadium steels are used in construction steel, machining tools, forged parts, auto parts, ball bearings, etc. Nonferrous alloys of vanadium are becoming increasingly important in supersonic aircraft applications where consideration of strength to weight ratios is essential. Lesser uses consist of target material for X-rays, and catalysts for sulfuric acid and synthetic rubber production.

Vanadium metal is essentially non-toxic, however, vanadium pentoxide, the most common environmental form has been shown to be potentially toxic. Vanadium pentoxide can enter the atmosphere from the burning of fuels or oil refining processes, and has the potential to contaminate the aquatic environment, via fall-out. Surface water concentrations have been shown to be 0.05 mg/l on the average, and as high as 0.3 mg/l.

In studies done using the rat, it was found that very small amounts of vanadium were essential in the animals diet. Even at relatively high levels given in drinking water as vanadyl sulfate, no apparent deleterious effects were noted, even though small amounts did accumulate in various organs. A recommended standard for vanadium in livestock water is 0.1 mg/l maximum concentration.

Vanadium pentoxide was found to cause acute and chronic, sub-lethal effects at a concentrations of 11.2 mg/l and 0.08 mg/l, respectively, on adult american flagfish. It should also be noted that at low levels (0.041 mg/l), increased reproduction and greater female size resulted. Another study found vanadium pentoxide to cause chronic effects on rainbow trout (using embyro-larval bioassays) at levels of 0.009 mg/l.

The oral toxicity of vanadium on humans has been found to be minimal. However, toxicity due to dust and fumes have been noted. At several mg/m^3 direct pulmonary complications were observed. Most effects seem to be acute although a few chronic toxic effects were noted. OSHA threshold ceiling regulations have been set for vanadium pentoxide in the workspace as 0.5 mg/m^3 for dust and 0.1 mg/m^3 as fumes.

<u>Zirconium (Zr)</u>. Zirconium is a nonconventional pollutant. It is a metallic element which forms a very stable oxide. Zirconium is found in at least 37 different mineral forms but the predominant commercial source is the mineral zircon (zirconium orthosilicate). Zircon is an almost ubiquitous mineral, occuring in granular limestone, gneiss, syenite, granite, sandstone, and many other minerals. The average concentration of zirconium in the earth's crust is estimated at 220 ppm.

Zirconium is a hard, shiny, ductile metal, similar to stainless steel in appearance. It can be hot-worked to form slabs, rods, and rounds from arc-melted ingot. Further cold-working of zirconium with intermediate annealings produces sheet, foil, bar wire, and tubing.

Zirconium is used as a containment material for the uranium oxide fuel pellets in nuclear power reactors. Zirconium is particulary useful for this application because of its ready availability, good ductility, resistance to radiation damage, low thermal-neutron absorption cross section, and excellent corrosion resistance in pressurized hot water. Zirconium is used as an alloy strengthening agent in aluminum and magnesium, and as the burning component in flash bulbs. It is employed as a corrosion resistant metal in the chemical process industry, and as pressure-vessel construction material in the ASME Boiler and Pressure Vessel Codes.

Zirconium is soluble in hot, very concentrated acids and insoluble in water and cold acids.

Zirconium is generally nontoxic as an element or in compounds. Lethal doses (LD50) of zirconium tetrachloride for rats and mice of 1,688 mg/kg and 665 mg/kg have been reported. At pH normally associated with biological activity, zirconium chiefly exists as the dioxide which is insoluble in water and in this form, zirconium is physiologically inert. Zirconium tetrachloride decomposes in water. A chronic value of 0.01 mg/l for rainbow trout has been reported for zirconium tetrachloride.

The oral toxicity is low; OSHA standards for pulmonary exposure specify a threshold limit value (TLV) of 5 mg zirconium per m^3.

POLLUTANT SELECTION BY SUBCATEGORY

Section V of this development document presented the data collected during nonferrous metals forming plant sampling visits and subsequent chemical analyses. This section examines that data and discusses the selection or exclusion of priority pollutants for limitation.

Pollutant Selection for Lead-Tin-Bismuth Forming

Table VI-3 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the lead-tin-bismuth forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table

VI-3 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-3 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
2. acrolein
3. acrylonitrile

5. benzidene
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
44. methylene chloride
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
67. butyl benzyl phthalate

68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene
80. fluorene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
84. pyrene
85. tetrachloroethylene
86. toluene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
125. selenium
126. silver
127. thallium
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-3 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Benzene was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 to 0.10 mg/l).

Carbon tetrachloride was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatments methods (0.05 mg/l).

1,1,1-Trichloroethane was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

1,1,2,2-Tetrachloroethane was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Parachlorometacresol was detected above its analytical quantification level in one of twelve samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Chloroform was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

Ethylbenzene was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Arsenic was detected above its analytical quantification level in seven of twelve samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Beryllium was detected above its analytical quantification level in one of thirteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Cadmium was detected above its analytical quantification level in two of thirteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.049 mg/l).

Mercury was detected above its analytical quantification level in five of thirteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Nickel was detected above its analytical quantification level in one of thirteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.22 mg/l).

<u>Pollutants Detected in a Small Number of Sources</u>. The priority pollutants identified by "SU" in Table VI-3 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources. The pollutants are individually discussed below.

Phenol was detected above its analytical quantification level in two of twelve samples and in one of seven sources.

Bis(2-ethylhexyl)phthalate was detected above its analytical quantification level in one of twelve samples and in one of seven sources.

Phenanthrene was detected above its analytical quantification level in one of twelve samples and in one of seven sources.

Chromium was detected above its analytical quantification level in one of thirteen samples and in one of eight sources.

Copper was detected above its analytical quantification level in four of thirteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.39 mg/l) in one of thirteen samples and in one of eight sources.

Cyanide was detected above its analytical quantification level in one of twelve samples and in one of seven sources.

Zinc was detected above its analytical quantification level in eight of thirteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.23 mg/l) in two of thirteen samples and in two of eight sources.

<u>Pollutants Selected for Consideration in Establishing Regulations for the Lead-Tin-Bismuth Forming Subcategory</u>. The priority pollutants identified by "RG" in Table VI-3 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Antimony was detected above its analytical quantification level in ten of twelve samples and above the level considered achievable by specific treatment methods (0.47 mg/l) in seven of twelve samples and in four of seven sources.

Lead was detected above its analytical quantification level in thirteen of thirteen samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in thirteen of thirteen samples and in eight of eight sources.

Pollutant Selection for Magnesium Forming

Table VI-4 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the magnesium forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-4 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-4 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benzidene
6. carbon tetrachloride
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine

38. ethylbenzene
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
66. bis(2-ethylhexyl) phthalate
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene
80. fluorene
81. phenanthrene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
84. pyrene
85. tetrachloroethylene
86. toluene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan

96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
115. arsenic
116. asbestos
118. cadmium
120. copper
124. nickel
125. selenium
127. thallium
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-4 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Methylene chloride was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

1,1,1-Trichloroethane was detected above its analytical quantification level in three of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

2-Nitrophenol was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Phenol was detected above its analytical quantification level in one of four samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Antimony was detected above its analytical quantification level in one of fifteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.47 mg/l).

Mercury was detected above its analytical quantification level in one of fifteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Silver was detected above its analytical quantification level in one of fifteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.07 mg/l).

Pollutants Detected in a Small Number of Sources. The priority pollutants identified by "SU" in Table VI-4 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Beryllium was detected above its analytical quantification level in three of fifteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.20 mg/l) in one of fifteen samples and in one of eleven sources.

Cyanide was detected above its analytical quantification level in three of fourteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.047 mg/l) in two of fourteen samples and in two of eleven sources.

Lead was detected above its analytical quantification level in one of fifteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.08 mg/l) in one of fifteen samples and in one of eleven sources.

Pollutants Selected for Consideration in Establishing Regulations for the Magnesium Forming Subcategory. The priority pollutants identified by "RG" in Table VI-4 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Chromium was detected above its analytical quantification level in ten of fifteen samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in seven of fifteen samples and in six of eleven sources.

Zinc was detected above its analytical quantification level in thirteen of fifteen samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in nine of fifteen samples and in six of eleven sources.

Pollutant Selection for Nickel-Cobalt Forming

Table VI-5 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the nickel-cobalt forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-5 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-5 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

2. acrolein
3. acrylonitrile
6. carbon tetrachloride
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
35. 2,4-dinitrotoluene
38. ethylbenzene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
56. nitrobenzene

59. 2,4-dinitrophenol
74. benzo(b)fluoranthene
79. benzo(ghi)perylene
82. dibenzo(a,h)anthracene
85. tetrachloroethylene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Never Found Above Their Analytical Quantification Level. The priority pollutants identified by "NQ" in Table VI-5 were never found above their analytical quantification level in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

72. benzo(a)anthracene
75. benzo(k)fluoranthene
76. chrysene

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-5 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Benzene was detected above its analytical quantification level in two of thirty-seven samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 to 0.10 mg/l).

Hexachloroethane was detected above its analytical quantification level in two of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Chloroform was detected above its analytical quantification level in one of thirty-six samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

1,1-Dichloroethylene was detected above its analytical quantification level in one of thirty-five samples; however, it was not found above the level considered achievable by specific treatment methods (0.1 mg/l).

1,2-Diphenylhydrazine was detected above its analytical quantification level in four of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Bis(2-chloroethoxy) methane was detected above its analytical quantification level in two of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Butyl benzyl phthalate was detected above its analytical quantification level in four of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.001 to 0.01 mg/l).

Di-n-octyl phthalate was detected above its analytical quantification level in one of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Diethyl phthalate was detected above its analytical quantification level in one of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.025 mg/l).

Dimethyl phthalate was detected above its analytical quantification level in one of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.025 mg/l).

Acenaphthylene was detected above its analytical quantification level in one of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Anthracene was detected above its analytical quantification level in two of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Indeno(1,2,3-c,d)pyrene was detected above its analytical quantification level in one of forty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Toluene was detected above its analytical quantification level in one of thirty-four samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Beryllium was detected above its analytical quantification level in four of eighty-eight samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Mercury was detected above its analytical quantification level in two of eighty-seven samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Thallium was detected above its analytical quantification level in five of eighty-seven samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

<u>Pollutants Detected in a Small Number of Sources</u>. The priority pollutants identified by "SU" in Table VI-5 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Acenaphthene was detected above its analytical quantification level in one of thirty-nine samples and in one of twenty-nine sources.

Benzidene was detected above its analytical quantification level in three of thirty-eight samples and in two of thirty sources.

1,1-Dichloroethane was detected above its analytical quantification level in five of thirty-six samples and in five of twenty-eight sources.

Parachlorometa cresol was detected above its analytical quantification level in three of forty-three samples and in three of thirty-four sources.

3,3'-Dichlorobenzidene was detected above its analytical quantification level in two of forty-two samples and in one of thirty-two sources.

2,4-Dimethylphenol was detected above its analytical quantification level in three of forty-two samples and in three of thirty-three sources.

2,6-Dinitrotoluene was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

Fluoranthene was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

Methylene chloride was detected above its analytical quantification level in nineteen of thirty-nine samples; however, it was only found above the level considered achievable by specific treatment methods (0.10 mg/l) in twelve of thirty-nine samples and in ten of thirty-one sources.

Naphthalene was detected above its analytical quantification level in five of thirty-nine samples and in four of thirty-two sources.

2-Nitrophenol was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

4-Nitrophenol was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

4,6-Dinitro-o-cresol was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

N-nitrosodiphenylamine was detected above its analytical quantification level in two of forty-two samples and in two of thirty-three sources.

N-nitrosodi-n-propylamine was detected above its analytical quantification level in six of forty-two samples and in four of thirty-three sources.

Pentachlorophenol was detected above its analytical quantification level in five of forty-two samples and in three of thirty-three sources.

Phenol was detected above its analytical quantification level in fourteen of forty-two samples; however, it was only found above the level considered achievable by specific treatment methods (0.05 mg/l) in ten of forty-two samples and in six of thirty-three sources.

Bis(2-ethylhexyl)phthalate was detected above its analytical quantification level in four of forty-two samples and in four of thirty-three sources.

Di-n-butyl phthalate was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

Benzo(a)pyrene was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

Fluorene was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

Phenanthrene was detected above its analytical quantification level in seven of forty-two samples and in seven of thirty-three sources.

Pyrene was detected above its analytical quantification level in one of forty-two samples and in one of thirty-three sources.

Antimony was detected above its analytical quantification level in seventeen of eighty-six samples and in fourteen of fifty-seven sources.

Arsenic was detected above its analytical quantification level in twenty-two of eighty-seven samples; however, it was only found above the level considered achievable by specific treatment methods (0.34 mg/l) in one of eighty-seven samples and in one of fifty-eight sources.

Cyanide was detected above its analytical quantification level in two of sixty-eight samples and in two of forty-one sources.

Selenium was detected above its analytical quantification level in five of eighty-six samples and in five of fifty-seven sources.

Silver was detected above its analytical quantification level in seven of eighty-six samples and in seven of fifty-seven sources.

Pollutants Selected for Consideration in Establishing Regulations for the Nickel-Cobalt Forming Subcategory. The priority pollutants identified by "RG" in Table VI-5 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1,1,1-Trichloroethane was detected above its analytical quantification level in eighteen of thirty-five samples and above the level considered achievable by specific treatment methods (0.01 mg/l) in eighteen of thirty-five samples and in fourteen of twenty-seven sources.

Cadmium was detected above its analytical quantification level in eighteen of eighty-seven samples and above the level considered achievable by specific treatment methods (0.049 mg/l) in seventeen of eighty-seven samples and in thirteen of fifty-eight sources.

Chromium was detected above its analytical quantification level in seventy-two of ninety samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in seventy-one of ninety samples and in fifty of fifty-nine sources.

Copper was detected above its analytical quantification level in eighty-three of eighty-nine samples and above the level considered achievable by specific treatment methods (0.39 mg/l) in fifty-six of eighty-nine samples and in thirty-nine of fifty-nine sources.

Lead was detected above its analytical quantification level in thirty-two of ninety samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in thirty-two of ninety samples and in twenty-six of fifty-nine sources.

Nickel was detected above its analytical quantification level in eighty-five of ninety samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in eighty-two of ninety samples and in fifty-two of fifty-nine sources.

Zinc was detected above its analytical quantification level in seventy-five of eighty-eight samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in forty-one of eighty-eight samples and in thirty-one of fifty-eight sources.

Pollutant Selection for Precious Metals Forming

Table VI-6 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the precious metals forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-6 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-6 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
2. acrolein
3. acrylonitrile
5. benzidene
6. carbon tetrachloride
7. chlorobenzene

8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. ethylbenzene
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
67. butyl benzyl phthalate
68. di-n-butyl phthalate

69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene
80. fluorene
81. phenanthrene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
84. pyrene
85. tetrachloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
117. beryllium
125. selenium
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-6 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Phenol was detected above its analytical quantification level in two of sixteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Bis(2-ethylhexyl) phthalate was detected above its analytical quantification level in one of sixteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Chloroethane was detected above its analytical quantification level in one of sixteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Antimony was detected above its analytical quantification level in three of thirty-seven samples; however, it was not found above the level considered achievable by specific treatment methods (0.47 mg/l).

Arsenic was detected above its analytical quantification level in five of thirty-seven samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Mercury was detected above its analytical quantification level in four of thirty-seven samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Thallium was detected above its analytical quantification level in six of thirty-seven samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Pollutants Detected in a Small Number of Sources. The priority pollutants identified by "SU" in Table VI-6 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Benzene was detected above its analytical quantification level in one of sixteen samples and in one of ten sources.

1,1,1-Trichloroethane was detected above its analytical quantification level in five of sixteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.01 mg/l) in five of sixteen samples and in four of ten sources.

Methylene chloride was detected above its analytical quantification level in eight of sixteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.10 mg/l) in four of sixteen samples and in four of ten sources.

Methyl chloride was detected above its analytical quantification level in one of sixteen samples and in one of ten sources.

Toluene was detected above its analytical quantification level in three of sixteen samples and in two of ten sources.

Trichloroethylene was detected above its analytical quantification level in two of sixteen samples and in two of ten sources.

Pollutants Selected for Consideration in Establishing Regulations for the Precious Metals Subcategory. The priority pollutants identified by "RG" in Table VI-6 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Chromium was detected above its analytical quantification level in eighteen of thirty-seven samples; however, it was only found above the level considered achievable by specific treatment methods (0.07 mg/l) in eight of thirty-seven samples and in four of twenty-six sources.

Cadmium was detected above its analytical quantification level in twenty-five of thirty-seven samples and above the level considered achievable by specific treatment methods (0.049 mg/l) in twenty-three of thirty-seven samples and in eighteen of twenty-six sources.

Copper was detected above its analytical quantification level in thirty-six of thirty-seven samples and above the level considered achievable by specific treatment methods (0.39 mg/l) in thirty-four of thirtyseven samples and in twenty-four of twenty-six sources.

Cyanide was detected above its analytical quantification level in five of thirty-three samples and above the level considered achievable by specific treatment methods (0.047 mg/l) in five of thirty-three samples and in four of twenty-three sources.

Lead was detected above its analytical quantification level in twenty-four of thirty-seven samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in twenty-four of thirty-seven samples and in twenty-two of twenty-six sources.

Nickel was detected above its analytical quantification level in twenty-six of thirty-seven samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in seventeen of thirty-seven samples and in thirteen of twenty-six sources.

Silver was detected above its analytical quantification level in twenty-seven of thirty-seven samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in eleven of thirty-seven samples and in nine of twenty-six sources.

Zinc was detected above its analytical quantification level in thirty-six of thirty-seven samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in twenty-seven of thirty-seven samples and in twenty-two of twenty-six sources.

Pollutant Selection for Refractory Metals Forming

Table VI-7 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the refractory metals subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-7 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-7 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benzidene
6. carbon tetrachloride
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
12. hexachloroethane
14. 1,1,2-trichloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine

38. ethylbenzene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
58. 4-nitrophenol
59. 2,4-dinitrophenol
61. N-nitrosodimethylamine
64. pentachlorophenol
71. dimethyl phthalate
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
79. benzo(ghi)perylene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Never Found Above Their Analytical Quantification Level. The priority pollutants identified by "NQ" in Table VI-7 were never found above their analytical quantification level in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

13. 1,1-dichloroethane
15. 1,1,2,2-tetrachloroethane
24. 2-chlorophenol
29. 1,1-dichloroethylene
84. pyrene
104. gamma-BHC

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-7 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Chloroform was detected above its analytical quantification level in two of eleven samples; however, it was not found above the level considered achievable by specific treatment methods (0.1 mg/l).

2,4-Dimethylphenol was detected above its analytical quantification level in one of eleven samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Nitrobenzene was detected above its analytical quantification level in one of eleven samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Antimony was detected above its analytical quantification level in three of twenty-five samples; however, it was not found above the level considered achievable by specific treatment methods (0.47 mg/l).

Arsenic was detected above its analytical quantification level in two of twenty-five samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Beryllium was detected above its analytical quantification level in two of twenty-five samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Mercury was detected above its analytical quantification level in one of twenty-five samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Selenium was detected above its analytical quantification level in three of twenty-five samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Thallium was detected above its analytical quantification level in two of twenty-five samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Pollutants Detected in a Small Number of Sources. The priority pollutants identified by "SU" in Table VI-7 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

2,4-Dinitrotoluene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Fluoranthene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Methylene chloride was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Naphthalene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

2-Nitrophenol was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

4,6-Dinitro-o-cresol was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

N-nitrosodiphenylamine was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

N-nitrosodi-n-propylamine was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Phenol was detected above its analytical quantification level in four of eleven samples; however, it was only found above the level considered achievable by specific treatment methods (0.05 mg/l) in two of eleven samples and in two of nine sources.

Bis(2-ethylhexyl) phthalate was detected above its analytical quantification level and the level considered achievable by specific treatments methods (0.01 mg/l) in three of eleven samples.

Butyl benzyl phthalate was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Di-n-butyl phthalate was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Di-n-octyl phthalate was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Diethyl phthalate was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Benzo(a)anthracene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Chrysene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Acenaphthylene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Anthracene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Fluorene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Phenanthrene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Tetrachloroethylene was detected above its analytical quantification level in two of eleven samples and in two of nine sources.

Toluene was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Cadmium was detected above its analytical quantification level in ten of twenty-five samples; however, it was only found above the level considered achievable by specific treatment methods (0.049 mg/l) in five of twenty-five samples and in four of twenty-one sources.

Cyanide was detected above its analytical quantification level in one of nineteen samples and in one of fifteen sources.

Pollutants Selected for Consideration in Establishing Regulations for the Refractory Metals Forming Subcategory. The priority pollutants identified by "RG" in Table VI-7 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are discussed individually below.

1,1,1-Trichloroethane was detected above its analytical quantification level in ten of eleven samples and above the level considered achievable by specific treatment methods (0.01 mg/l) in nine of eleven samples.

Chromium was detected above its analytical quantification level in nineteen of twenty-five samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in sixteen of twenty-five samples and in fourteen of twenty-one sources.

Copper was detected above its analytical quantification level in thirteen of twenty-five samples and above the level considered achievable by specific treatment methods (0.39 mg/l) in nine of twenty-five samples and in seven of twenty-one sources.

Lead was detected above its analytical quantification level in eleven of twenty-five samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in eight of twenty-five samples and in eight of twenty-one sources.

Nickel was detected above its analytical quantification level in fifteen of twenty-five samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in thirteen of twenty-five samples and in eleven of twenty-one sources.

Silver was detected above its analytical quantification level in eleven of twenty-five samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in seven of twenty-five samples and in five of twenty-one sources.

Zinc was detected above its analytical quantification level in eighteen of twenty-five samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in seven of twenty-five samples and in seven of twenty-one sources.

Pollutant Selection for Titanium Forming

Table VI-8 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the titanium forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed above. Table VI-8 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-8 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
2. acrolein
3. acrylonitrile

4. benzene
5. benzidene
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. ethylbenzene
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol

61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
65. phenol
66. bis(2-ethylhexyl) phthalate
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene
80. fluorene
81. phenanthrene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
84. pyrene
85. tetrachloroethylene
86. toluene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-8 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Carbon tetrachloride was detected above its analytical quantification level in one of one samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Methylene chloride was detected above its analytical quantification level in one of one samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

Antimony was detected above its analytical quantification level in four of twenty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.47 mg/l).

Beryllium was detected above its analytical quantification level in one of twenty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Mercury was detected above its analytical quantification level in one of twenty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Silver was detected above its analytical quantification level in four of twenty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.07 mg/l).

Thallium was detected above its analytical quantification level in one of twenty-one samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Pollutants Detected in a Small Number of Sources. The priority pollutants identified by "SU" in Table VI-8 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually listed below.

Arsenic was detected above its analytical quantification level in six of twenty-one samples; however, it was only found above the level considered achievable by specific treatment methods (0.34 mg/l) in two of twenty-one samples and in two of sixteen sources.

Cadmium was detected above its analytical quantification level in three of twenty-one samples and in three of sixteen sources.

Selenium was detected above its analytical quantification level in two of twenty-one samples and in two of sixteen sources.

Pollutants Selected for Consideration in Establishing Regulations for the Titanium Forming Subcategory. The priority pollutants identified by "RG" in Table VI-8 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Chromium was detected above its analytical quantification level in fifteen of twenty-one samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in thirteen of twenty-one samples and in twelve of sixteen sources.

Copper was detected above its analytical quantification level in twelve of twenty-one samples and above the level considered achievable by specific treatment methods (0.39 mg/l) in ten of twenty-one samples and in nine of sixteen sources.

Cyanide was detected above its analytical quantification level in six of fourteen samples and above the level considered achievable by specific treatment methods (0.047 mg/l) in five of fourteen samples and in five of thirteen sources.

Lead was detected above its analytical quantification level in eighteen of twenty-one samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in eighteen of twenty-one samples and in fourteen of sixteen sources.

Nickel was detected above its analytical quantification level in fourteen of twenty-one samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in twelve of twenty-one samples and in eleven of sixteen sources.

Zinc was detected above its analytical quantification level in sixteen of twenty-one samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in ten of twenty-one samples and in ten of sixteen sources.

Pollutant Selection for Uranium Forming

Table VI-9 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the uranium forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-9 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-9 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benzidene
6. carbon tetrachloride
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
23. chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. ethylbenzene
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
44. methylene chloride
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane

50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
65. phenol
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene
80. fluorene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
84. pyrene
85. tetrachloroethylene
86. toluene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242

107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

<u>Pollutants Detected Below Levels Achievable by Treatment</u>. The priority pollutants identified by "NT" in Table VI-9 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Antimony was detected above its analytical quantification level in four of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.47 mg/l).

Arsenic was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Mercury was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Selenium was detected above its analytical quantification level in four of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Silver was detected above its analytical quantification level in nine of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.07 mg/l).

Thallium was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Pollutants Detected in a Small Number of Sources. The priority pollutants identified by "SU" in Table VI-9 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Parachlorometa cresol was detected above its analytical quantification level in one of four samples and in one of four sources.

Phenanthrene was detected above its analytical quantification level in one of four samples and in one of four sources.

Beryllium was detected above its analytical quantification level in fourteen of fourteen samples; however, it was only found above the level considered achievable by specific treatment methods (0.20 mg/l) in three of fourteen samples and in three of thirteen sources.

Cyanide was detected above its analytical quantification level in three of twelve samples and in three of twelve sources.

Pollutants Selected for Consideration in Establishing Regulations for the Uranium Forming Subcategory. The priority pollutants identified by "RG" in Table VI-9 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Bis(2-ethylhexyl) phthalate was detected above its analytical quantification level in three of four samples and above the level considered achievable by specific treatment methods (0.01 mg/l) in three of four samples and in three of four sources.

Cadmium was detected above its analytical quantification level in eight of fourteen samples and above the level considered achievable by specific treatment methods (0.049 mg/l) in seven of fourteen samples and in six of thirteen sources.

Chromium was detected above its analytical quantification level in eleven of fourteen samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in nine of fourteen samples and in eight of thirteen sources.

Copper was detected above its analytical quantification level in fourteen of fourteen samples and above the level considered achievable by specific treatment methods (0.39 mg/l) in ten of fourteen samples and in nine of thirteen sources.

Lead was detected above its analytical quantification level in thirteen of fourteen samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in thirteen of fourteen samples and in twelve of thirteen sources.

Nickel was detected above its analytical quantification level in eleven of fourteen samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in eight of fourteen samples and in seven of thirteen sources.

Zinc was detected above its analytical quantification level in fourteen of fourteen samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in eleven of fourteen samples and in ten of thirteen sources.

Pollutant Selection for Zinc Forming

Table VI-10 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the zinc forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-10 is based on the raw wastewater sampling data presented in Section V.

<u>Pollutants Never Detected</u>. The priority pollutants identified by "ND" in Table VI-10 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

2. acrolein
5. benzidene
9. hexachlorobenzene
12. hexachloroethane
16. chloroethane
17. bis(chloromethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
31. 2,4-dichlorophenol
35. 2,4-dinitrotoluene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
45. methyl chloride
49. trichlorofluoromethane
50. dichlorodifluoromethane
52. hexachlorobutadiene

53. hexachlorocyclopentadiene
54. isophorone
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
65. phenol
69. di-n-octyl phthalate
71. dimethyl phthalate
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
77. acenaphthylene
79. benzo(ghi)perylene
80. fluorene
82. dibenzo(a,h)anthracene
84. pyrene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
114. antimony
115. arsenic
116. asbestos
117. beryllium
118. cadmium
120. copper
122. lead

123. mercury
125. selenium
126. silver
127. thallium
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Never Found Above Their Analytical Quantification Level. The priority pollutants identified by "NQ" in Table VI-10 were never found above their analytical quantification level in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
7. chlorobenzene
8. 1,2,4-trichlorobenzene
10. 1,2-dichloroethane
14. 1,1,2-trichloroethane
37. 1,2-diphenylhydrazine
46. methyl bromide

Pollutants Detected But Present Solely as a Result of Its Presence in the Intake Waters. Paragraph 8(a)(iii) allows for the exclusion of a priority pollutant if it is detected in the source water of the samples taken. The toxic pollutant identified by "TS" in Table VI-10 was found above its analytical quantification level but not above the level in the source water; therefore, it was not selected for consideration in establishing regulations for this subcategory. The pollutant is listed below:

83. indeno(1,2,3-cd) pyrene

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-10 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Acrylonitrile was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Benzene was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 to 0.10 mg/l).

Carbon tetrachloride was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment method (0.05 mg/l).

1,1,1-Trichloroethane was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

1,1-Dichloroethane was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

1,1,2,2-Tetrachloroethane was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Bis(2-chloroethylene) ether was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Chloroform was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

1,1-Dichloroethylene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.1 mg/l).

1,2-trans-Dichloroethylene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.1 mg/l).

1,2-Dichloropropane was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

1,2-Dichloropropylene was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

2,4-Dimethylphenol was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

2,6-Dinitrotoluene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Ethylbenzene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Fluoranthene was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Bis(2-chloroethoxy) methane was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Methylene chloride was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

Bromoform was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Dichlorobromomethane was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

Naphthalene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Butyl benzyl phthalate was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.001 to 0.01 mg/l).

Diethyl phthalate was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.025 mg/l).

Benzo(a)anthracene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Chrysene was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.001 mg/l).

Anthracene was detected above its analytical quantifica-tion level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Phenanthrene was detected above its analytical quantification level in one of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Tetrachloroethylene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Toluene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Trichloroethylene was detected above its analytical quantification level in two of two samples; however, it was not found above the level considered achievable by specific treatment methods (0.01 mg/l).

Pollutants Selected for Consideration in Establishing Regulations for the Zinc Forming Subcategory. The priority pollutants identified by "RG" in Table VI-10 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Chlorodibromomethane was detected above its analytical quantification level in two of two samples and above the level considered achievable by specific treatment methods (0.10 mg/l) in one of two samples and in one of two sources.

Bis(2-ethylhexyl) phthalate was detected above its analytical quantification level in one of two samples and above the level considered achievable by specific treatment methods (0.01 mg/l) in one of two samples and in one of two sources.

Di-n-butyl phthalate was detected above its analytical quantification level in one of two samples and above the level considered achievable by specific treatment methods (0.025 mg/l) in one of two samples and in one of two sources.

Chromium was detected above its analytical quantification level in one of two samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in one of two samples and in one of two sources.

Cyanide was detected above its analytical quantification level in one of two samples and above the level considered achievable by specific treatment methods (0.047 mg/l) in one of two samples and in one of two sources.

Nickel was detected above its analytical quantification level in one of two samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in one of two samples and in one of two sources.

Zinc was detected above its analytical quantification level in two of two samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in two of two samples and in two of two sources.

Pollutant Selection for Zirconium-Hafnium Forming

Table VI-11 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the zirconium-hafnium forming subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-11 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-11 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
3. acrylonitrile
5. benzidene
6. carbon tetrachloride
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
12. hexachloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
34. 2,4-dimethylphenol

35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
65. phenol
67. butyl benzyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
79. benzo(ghi)perylene
80. fluorene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
84. pyrene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide

102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221
109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Never Found Above Their Analytical Quantification Level. The priority pollutants identified by "NQ" in Table VI-11 were never found above their analytical quantification level in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

4. benzene
7. chlorobenzene
13. 1,1-dichloroethane
57. 2-nitrophenol
68. di-n-butyl phthalate
70. diethyl phthalate
78. anthracene
81. phenanthrene
85. tetrachloroethylene
87. trichloroethylene

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-11 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below:

Acrolein was detected above its analytical quantification level in one of ten samples; however, it was not found above the level considered achievable by specific treatment methods (0.100 mg/l).

Chloroform was detected above its analytical quantification level in one of ten samples; however, it was not found above the level considered achievable by specific treatment methods (0.1 mg/l).

Beryllium was detected above its analytical quantification level in thirteen of nineteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Mercury was detected above its analytical quantification level in three of nineteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.036 mg/l).

Selenium was detected above its analytical quantification level in six of nineteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.20 mg/l).

Silver was detected above its analytical quantification level in five of nineteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.07 mg/l).

Pollutants Detected in a Small Number of Sources. The priority pollutants identified by "SU" in Table VI-11 were found above their analytical quantification level at only a small number of sources within the category and are uniquely related to only those sources; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below:

Parachlorometa cresol was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Ethylbenzene was detected above its analytical quantification level in two of ten samples and in two of nine sources.

Bis(2-ethylhexyl) phthalate was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Di-n-octyl phthalate was detected above its analytical quantification level in one of eleven samples and in one of nine sources.

Antimony was detected above its analytical quantification level in three of nineteen samples and in three of fifteen sources.

Arsenic was detected above its analytical quantification level in two of nineteen samples and in two of fifteen sources.

Cadmium was detected above its analytical quantification level in three of nineteen samples and in three of fifteen sources.

Thallium was detected above its analytical quantification level in three of nineteen samples and in three of fifteen sources.

Pollutants Selected for Consideration in Establishing Regulations for the Zirconium-Hafnium Forming Subcategory. The priority pollutants identified by "RG" in Table VI-11 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below:

1,1,1-Trichloroethane was detected above its analytical quantification level in three of ten samples and above the level considered achievable by specific treatment methods (0.01 mg/l) in three of ten samples and in three of nine sources.

Methylene chloride was detected above its analytical quantification level in six of ten samples and above the level considered achievable by specific treatment methods (0.10 mg/l) in five of ten samples and in four of nine sources.

Toluene was detected above its analytical quantification level in five of ten samples and above the level considered achievable by specific treatment methods (0.05 mg/l) in four of ten samples and in three of nine sources.

Chromium was detected above its analytical quantification level in eighteen of nineteen samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in ten of nineteen samples and in eight of fifteen sources.

Copper was detected above its analytical quantification level in sixteen of nineteen samples and above the level considered achievable by specific treatment methods (0.39 mg/l) in seven of nineteen samples and in seven of fifteen sources.

Cyanide was detected above its analytical quantification level in two of seventeen samples and above the level considered achievable by specific treatment methods (0.047 mg/l) in two of seventeen samples and in two of thirteen sources.

Lead was detected above its analytical quantification level in eighteen of nineteen samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in sixteen of nineteen samples and in fourteen of fifteen sources.

Nickel was detected above its analytical quantification level in eight of nineteen samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in five of nineteen samples and in five of fifteen sources.

Zinc was detected above its analytical quantification level in seventeen of nineteen samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in eight of nineteen samples and in eight of fifteen sources.

Pollutant Selection for Metal Powders

Table VI-12 summarizes the disposition of priority pollutants with respect to each waste stream and overall for the metal powders subcategory. These data provide the basis for the categorization of specific pollutants, as discussed below. Table VI-12 is based on the raw wastewater sampling data presented in Section V.

Pollutants Never Detected. The priority pollutants identified by "ND" in Table VI-12 were not detected in any samples from this subcategory; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are listed below:

1. acenaphthene
2. acrolein
3. acrylonitrile
5. benzidene
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
10. 1,2-dichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3'-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,2-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. ethylbenzene
39. fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
45. methyl chloride
46. methyl bromide
47. bromoform
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene

53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
65. phenol
66. bis(2-ethylhexyl) phthalate
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
72. benzo(a)anthracene
73. benzo(a)pyrene
74. benzo(b)fluoranthene
75. benzo(k)fluoranthene
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene
80. fluorene
81. phenanthrene
82. dibenzo(a,h)anthracene
83. indeno(1,2,3-cd)pyrene
84. pyrene
85. tetrachloroethylene
87. trichloroethylene
88. vinyl chloride
89. aldrin
90. dieldrin
91. chlordane
92. 4,4'-DDT
93. 4,4'-DDE
94. 4,4'-DDD
95. alpha-endosulfan
96. beta-endosulfan
97. endosulfan sulfate
98. endrin
99. endrin aldehyde
100. heptachlor
101. heptachlor epoxide
102. alpha-BHC
103. beta-BHC
104. gamma-BHC
105. delta-BHC
106. PCB-1242
107. PCB-1254
108. PCB-1221

109. PCB-1232
110. PCB-1248
111. PCB-1260
112. PCB-1016
113. toxaphene
116. asbestos
117. beryllium
118. cadmium
123. mercury
125. selenium
126. silver
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Pollutants Detected Below Levels Achievable by Treatment. The priority pollutants identified by "NT" in Table VI-12 were found above their analytical quantification level only at a concentration below the concentration considered achievable by specific available treatment methods; therefore, they were not selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

Benzene was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 to 0.10 mg/l).

Carbon tetrachloride was detected above its analytical quantification level in four of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Methylene chloride was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.10 mg/l).

Toluene was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.05 mg/l).

Antimony was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.47 mg/l).

Arsenic was detected above its analytical quantification level in one of fifteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Thallium was detected above its analytical quantification level in one of fourteen samples; however, it was not found above the level considered achievable by specific treatment methods (0.34 mg/l).

Pollutants Selected for Consideration in Establishing Regulations for the Metal Powders Subcategory. The priority pollutants identified by "RG" in Table VI-12 are those not eliminated from consideration for any of the reasons listed above; therefore, each was selected for consideration in establishing regulations for this subcategory. The pollutants are individually discussed below.

1,1,1-Trichloroethane was detected above its analytical quantification level in seven of fourteen samples and above the level considered achievable by specific treatment methods (0.01 mg/l) in seven of fourteen samples and in four of six sources.

Chromium was detected above its analytical quantification level in eleven of sixteen samples and above the level considered achievable by specific treatment methods (0.07 mg/l) in seven of sixteen samples and in five of eight sources.

Copper was detected above its analytical quantification level in ten of sixteen samples and above the level considered achievable by specific treatment methods (0.39 mg/l) in ten of sixteen samples and in five of eight sources.

Cyanide was detected above its analytical quantification level in eleven of sixteen samples and above the level considered achievable by specific treatment methods (0.047 mg/l) in eight of sixteen samples and in five of eight sources.

Lead was detected above its analytical quantification level in eight of sixteen samples and above the level considered achievable by specific treatment methods (0.08 mg/l) in eight of sixteen samples and in four of eight sources.

Nickel was detected above its analytical quantification level in eleven of sixteen samples and above the level considered achievable by specific treatment methods (0.22 mg/l) in ten of sixteen samples and in four of eight sources.

Zinc was detected above its analytical quantification level in thirteen of fifteen samples and above the level considered achievable by specific treatment methods (0.23 mg/l) in nine of fifteen samples and in five of seven sources.

Table VI-1

LIST OF 129 PRIORITY POLLUTANTS

Compound Name

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benzidene
6. carbon tetrachloride (tetrachloromethane)

Chlorinated benzenes (other than dichlorobenzenes)

7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene

Chlorinated ethanes (including 1,2-dichloroethane, 1,1,1-trichloroethane and hexachloroethane)

10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane

Chloroalkyl ethers (chloromethyl, chloroethyl and mixed ethers)

17. bis (chloromethyl) ether
18. bis (2-chloroethyl) ether
19. 2-chloroethyl vinyl ether (mixed)

Chlorinated naphthalene

20. 2-chloronaphthalene

Table VI-1 (Continued)

LIST OF 129 PRIORITY POLLUTANTS

Chlorinated phenols (other than those listed elsewhere; includes trichlorophenols and chlorinated cresols)

21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. chloroform (trichloromethane)
24. 2-chlorophenol

Dichlorobenzenes

25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene

Dichlorobenzidine

28. 3,3'-dichlorobenzidine

Dichloroethylenes (1,1-dichloroethylene and 1,2-dichloroethylene)

29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol

Dichloropropane and dichloropropene

32. 1,2-dichloropropane
33. 1,2-dichloropropylene (1,3-dichloropropene)
34. 2,4-dimethylphenol

Dinitrotoluene

35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. ethylbenzene
39. fluoranthene

Table VI-1 (Continued)

LIST OF 129 PRIORITY POLLUTANTS

Haloethers (other than those listed elsewhere)

40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-choroethoxy) methane

Halomethanes (other than those listed elsewhere)

44. methylene chloride (dichloromethane)
45. methyl chloride (chloromethane)
46. methyl bromide (bromomethane)
47. bromoform (tribromomethane)
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. hexachlorobutadiene
53. hexachlorocyclopentadiene
54. isophorone
55. naphthalene
56. nitrobenzene

Nitrophenols (including 2,4-dinitrophenol and dinitrocresol)

57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol

Nitrosamines

61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. pentachlorophenol
65. phenol

Table VI-1 (Continued)

LIST OF 129 PRIORITY POLLUTANTS

Phthalate esters

66. bis(2-ethylhexyl) phthalate
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate

Polynuclear aromatic hydrocarbons

72. benzo (a)anthracene (1,2-benzanthracene)
73. benzo (a)pyrene (3,4-benzopyrene)
74. 3,4-benzofluoranthene
75. benzo(k)fluoranthane (11,12-benzofluoranthene)
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene (1,11-benzoperylene)
80. fluorene
81. phenanthrene
82. dibenzo (a,h)anthracene (1,2,5,6-dibenzanthracene)
83. indeno (1,2,3-cd)pyrene (w,e,-o-phenylenepyrene)
84. pyrene
85. tetrachloroethylene
86. toluene
87. trichloroethylene
88. vinyl chloride (chloroethylene)

Pesticides and metabolites

89. aldrin
90. dieldrin
91. chlordane (technical mixture and metabolites)

DDT and metabolites

92. 4,4'-DDT
93. 4,4'-DDE(p,p'DDX)
94. 4,4'-DDD(p,p'TDE)

Table VI-1 (Continued)

LIST OF 129 PRIORITY POLLUTANTS

Endosulfan and metabolites

95. a-endosulfan-Alpha
96. b-endosulfan-Beta
97. endosulfan sulfate

Endrin and metabolites

98. endrin
99. endrin aldehyde

Heptachlor and metabolites

100. heptachlor
101. heptachlor epoxide

Hexachlorocyclohexane (all isomers)

102. a-BHC-Alpha
103. b-BHC-Beta
104. r-BHC (lindane)-Gamma
105. g-BHC-Delta

Polychlorinated biphenyls (PCB's)

106. PCB-1242 (Arochlor 1242)
107. PCB-1254 (Arochlor 1254)
108. PCB-1221 (Arochlor 1221)
109. PCB-1232 (Arochlor 1232)
110. PCB-1248 (Arochlor 1248)
111. PCB-1260 (Arochlor 1260)
112. PCB-1016 (Arochlor 1016)

Metals and Cyanide, and Asbestos

114. antimony
115. arsenic
116. asbestos (Fibrous)
117. beryllium
118. cadmium
119. chromium (Total)

Table VI-1 (Continued)

LIST OF 129 PRIORITY POLLUTANTS

Metals and Cyanide, and Asbestos (Cont.)

120. copper
121. cyanide (Total)
122. lead
123. mercury
124. nickel
125. selenium
126. silver
127. thallium
128. zinc

Other

113. toxaphene
129. 2,3,7,8-tetra chlorodibenzo-p-dioxin (TCDD)

Table VI-2

PRIORITY POLLUTANT ANALYTICAL QUANTIFICATION AND TREATMENT EFFECTIVENESS CONCENTRATIONS

	Pollutant	Analytical Quantification Concentration (mg/l)(a)	Treatment Effectiveness Concentration (mg/l)(b)
1.	acenaphthene	0.010	0.010
2.	acrolein	0.010	0.100
3.	acrylonitrile	0.010	0.01
4.	benzene	0.010	0.05 - 0.10
5.	benzidine	0.010	0.01
6.	carbon tetrachloride	0.010	0.05
7.	chlorobenzene	0.010	0.025
8.	1,2,4-trichlorobenzene	0.010	0.01
9.	hexachlorobenzene	0.010	0.01
10.	1,2-dichloroethane	0.010	0.1
11.	1,1,1-trichloroethane	0.010	0.01
12.	hexachloroethane	0.010	0.01
13.	1,1-dichloroethane	0.010	0.01
14.	1,1,2-trichloroethane	0.010	0.1
15.	1,1,2,2-tetrachloroethane	0.010	0.05
16.	chloroethane	0.010	0.01
17.	bis(chloromethyl) ether	0.010	0.01
18.	bis(2-chloroethyl) ether	0.010	0.01
19.	2-chloroethyl vinyl ether	0.010	0.01
20.	2-chloronaphthalene	0.010	0.01
21.	2,4,6-trichlorophenol	0.010	0.025
22.	parachlorometa cresol	0.010	0.05
23.	chloroform	0.010	0.1
24.	2-chlorophenol	0.010	0.05
25.	1,2-dichlorobenzene	0.010	0.05
26.	1,3-dichlorobenzene	0.010	0.01
27.	1,4-dichlorobenzene	0.010	0.01
28.	3,3'-dichlorobenzidine	0.010	0.01
29.	1,1-dichloroethylene	0.010	0.1
30.	1,2-trans-dichloroethylene	0.010	0.1
31.	2,4-dichlorophenol	0.010	0.01
32.	1,2-dichloropropane	0.010	0.01
33.	1,2-dichloropropylene	0.010	0.01
34.	2,4-dimethylphenol	0.010	0.05
35.	2,4-dinitrotoluene	0.010	0.05
36.	2,6-dinitrotoluene	0.010	0.05
37.	1,2-diphenylhydrazine	0.010	0.05
38.	ethylbenzene	0.010	0.05
39.	fluoranthene	0.010	0.01
40.	4-chlorophenyl phenyl ether	0.010	0.01
41.	4-bromophenyl phenyl ether	0.010	0.01
42.	bis(2-chloroisopropyl) ether	0.010	0.01
43.	bis(2-chloroethoxy) methane	0.010	0.01

Table VI-2 (Continued)

PRIORITY POLLUTANT ANALYTICAL QUANTIFICATION AND TREATMENT EFFECTIVENESS CONCENTRATIONS

Pollutant	Analytical Quantification Concentration (mg/l)(a)	Treatment Effectiveness Concentration (mg/l)(b)
44. methylene chloride	0.010	0.10
45. methyl chloride	0.010	0.01
46. methyl bromide	0.010	0.01
47. bromoform	0.010	0.05
48. dichlorobromomethane	0.010	0.10
49. trichlorofluoromethane	0.010	0.01
50. dichlorodifluoromethane	0.010	0.01
51. chlorodibromomthane	0.010	0.10
52. hexachlorobutadiene	0.010	0.01
53. hexachlorocyclopentadiene	0.010	0.01
54. isophorone	0.010	0.05
55. naphthalene	0.010	0.05
56. nitrobenzene	0.010	0.05
57. 2-nitrophenol	0.010	0.01
58. 4-nitrophenol	0.010	0.05
59. 2,4-dinitrophenol	0.010	0.025
60. 4,6-dinitro-o-cresol	0.010	0.025
61. N-nitrosodimethylamine	0.010	0.01
62. N-nitrosodiphenylamine	0.010	0.01
63. N-nitrosodi-n-propylamine	0.010	0.01
64. pentachlorophenol	0.010	0.01
65. phenol	0.010	0.05
66. bis(2-ethylhexyl)phthalate	0.010	0.01
67. butyl benzyl phthalate	0.010	0.001 - 0.01
68. di-n-butyl phthalate	0.010	0.025
69. di-n-octyl phthalate	0.010	0.01
70. diethyl phthalate	0.010	0.025
71. dimethyl phthalate	0.010	0.025
72. benzo(a)anthracene	0.010	0.01
73. benzo(a)pyrene	0.010	0.01
74. 3,4-benzofluoranthene	0.010	0.01
75. benzo(k)fluoranthene	0.010	0.01
76. chrysene	0.010	0.001
77. acenaphthylene	0.010	0.01
78. anthracene	0.010	0.01
79. benzo(ghi)perylene	0.010	0.01
80. fluorene	0.010	0.01
81. phenanthrene	0.010	0.01
82. dibenzo(a,h)anthracene	0.010	0.01
83. indeno(1,2,3-cd)pyrene	0.010	0.01
84. pyrene	0.010	0.001 - 0.01
85. tetrachloroethylene	0.010	0.05
86. toluene	0.010	0.05

Table VI-2 (Continued)

PRIORITY POLLUTANT ANALYTICAL QUANTIFICATION AND TREATMENT EFFECTIVENESS CONCENTRATIONS

	Pollutant	Analytical Quantification Concentration (mg/l)(a)	Treatment Effectiveness Concentration (mg/l)(b)
87.	trichloroethylene	0.010	0.01
88.	vinyl chloride	0.010	0.01
89.	aldrin	0.005	0.001
90.	dieldrin	0.005	0.01
91.	chlordane	0.005	0.01
92.	4,4'-DDT	0.005	0.01
93.	4,4'-DDE	0.005	0.01
94.	4,4'-DDD	0.005	0.01
95.	alpha-endosulfan	0.005	0.001
96.	beta-endosulfan	0.005	0.01
97.	endosulfan sulfate	0.005	0.01
98.	endrin	0.005	0.01
99.	endrin aldehyde	0.005	0.01
100.	heptachlor	0.005	0.01
101.	heptachlor epoxide	0.005	0.01
102.	alpha-BHC	0.005	0.01
103.	beta-BHC	0.005	0.01
104.	gamma-BHC	0.005	0.01
105.	delta-BHC	0.005	0.01
106.	PCB-1242	0.005	0.001
107.	PCB-1254	0.005	0.001
108.	PCB-1221	0.005	0.001
109.	PCB-1232	0.005	0.001
110.	PCB-1248	0.005	0.001
111.	PCB-1260	0.005	0.001
112.	PCB-1016	0.005	0.001
113.	toxaphene	0.005	0.01
114.	antimony	0.010	0.47
115.	arsenic	0.010	0.34
116.	asbestos	10 MFL	10 MFL
117.	beryllium	0.005	0.20
118.	cadmium	0.020	0.049
119.	chromium	0.020	0.07
120.	copper	0.050	0.39
121.	cyanide (c)	0.02	0.047
122.	lead	0.050	0.08
123.	mercury	0.0002	0.036
124.	nickel	0.050	0.22
125.	selenium	0.010	0.20
126.	silver	0.010	0.07
127.	thallium	0.010	0.34
128.	zinc	0.020	0.23

Table VI-2 (Continued)

PRIORITY POLLUTANT ANALYTICAL QUANTIFICATION AND TREATMENT EFFECTIVENESS CONCENTRATIONS

Pollutant	Analytical Quantification Concentration (mg/l)(a)	Treatment Effectiveness Concentration (mg/l)(b)
129. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	--	--

(a) Analytical quantification concentration was reported with the data (see Section V).

(b) Treatment effectiveness concentrations are based on performance of lime precipitation, sedimentation, and filtration for toxic metals and activated carbon for toxic organics.

(c) Analytical quantification concentration for EPA Method 352.2, Total Cyanide Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1979.

Table VI-3

PRIORITY POLLUTANT DISPOSITION
LEAD-TIN-BISMUTH FORMING SUBCATEGORY

Pollutant	Rolling Spent Emulsions	Extrusion Press and Soln. Heat Trt. CCW	Continuous Strip Casting CCW	Semi-Continuous Ingot Casting CCW	Shot Casting CCW	Alkaline Cleaning Spent Baths	Alkaline Cleaning Rinsewater	Total Subcategory
1. acenaphthene	ND	ND	NA	ND	ND	ND	ND	ND
2. acrolein	ND	ND	NA	ND	NA	NA	NA	ND
3. acrylonitrile	ND	ND	NA	ND	NA	NA	NA	ND
4. benzene	ND	NT	NA	ND	NA	NA	NA	NT
5. benzidine	ND	ND	NA	ND	ND	ND	ND	ND
6. carbon tetrachloride	NT	ND	NA	ND	NA	NA	NA	NT
7. chlorobenzene	ND	ND	NA	ND	NA	NA	NA	ND
8. 1,2,4-trichlorobenzene	ND	ND	NA	ND	ND	ND	ND	ND
9. hexachlorobenzene	ND	ND	NA	ND	ND	ND	ND	ND
10. 1,2-dichloroethane	ND	ND	NA	ND	NA	NA	NA	ND
11. 1,1,1-trichloroethane	NT	ND	NA	ND	NA	NA	NA	NT
12. hexachloroethane	ND	ND	NA	ND	ND	ND	ND	ND
13. 1,1-dichloroethane	ND	ND	NA	ND	NA	NA	NA	ND
14. 1,1,2-trichloroethane	ND	ND	NA	ND	NA	NA	NA	ND
15. 1,1,2,2-tetrachloroethane	NT	ND	NA	ND	NA	NA	NA	NT
16. chloroethane	ND	ND	NA	ND	NA	NA	NA	ND
17. bis(chloromethyl) ether	ND	ND	NA	ND	NA	NA	NA	ND
18. bis(2-chloroethyl) ether	ND	ND	NA	ND	ND	ND	ND	ND
19. 2-chloroethyl vinyl ether	ND	ND	NA	ND	NA	NA	NA	ND
20. 2-chloronaphthalene	ND	ND	NA	ND	ND	ND	ND	ND
21. 2,4,6-trichlorophenol	ND	ND	NA	ND	ND	ND	ND	ND
22. parachlorometa cresol	ND	ND	NA	ND	ND	NT	ND	NT
23. chloroform	NT	NT	NA	ND	NA	NA	NA	NT
24. 2-chlorophenol	ND	ND	NA	ND	ND	ND	ND	ND
25. 1,2-dichlorobenzene	ND	ND	NA	ND	ND	ND	ND	ND
26. 1,3-dichlorobenzene	ND	ND	NA	ND	ND	ND	ND	ND
27. 1,4-dichlorobenzene	ND	ND	NA	ND	ND	ND	ND	ND
28. 3,3'-dichlorobenzidine	ND	ND	NA	ND	ND	ND	ND	ND
29. 1,1-dichloroethylene	ND	ND	NA	ND	NA	NA	NA	ND
30. 1,2-trans-dichloroethylene	ND	ND	NA	ND	NA	NA	NA	ND
31. 2,4-dichlorophenol	ND	ND	NA	ND	ND	ND	ND	ND
32. 1,2-dichloropropane	ND	ND	NA	ND	NA	NA	NA	ND
33. 1,2-dichloropropylene	ND	ND	NA	ND	NA	NA	NA	ND
34. 2,4-dimethylphenol	ND	ND	NA	ND	ND	ND	ND	ND
35. 2,4-dinitrotoluene	ND	ND	NA	ND	ND	ND	ND	ND
36. 2,6-dinitrotoluene	ND	ND	NA	ND	ND	ND	ND	ND
37. 1,2-diphenylhydrazine	ND	ND	NA	ND	ND	ND	ND	ND
38. ethylbenzene	NT	ND	NA	ND	NA	NA	NA	NT
39. fluoranthene	ND	ND	NA	ND	ND	ND	ND	ND
40. 4-chlorophenyl phenyl ether	ND	ND	NA	ND	ND	ND	ND	ND
41. 4-bromophenyl phenyl ether	ND	ND	NA	ND	ND	ND	ND	ND
42. bis(2-chloroisopropyl) ether	ND	ND	NA	ND	ND	ND	ND	ND
43. bis(2-chloroethoxy) methane	ND	ND	NA	ND	ND	ND	ND	ND

Table VI-3 (Continued)

PRIORITY POLLUTANT DISPOSITION
LEAD-TIN-BISMUTH FORMING SUBCATEGORY

Pollutant	Rolling Spent Emulsions	Extrusion Press and Soln. Heat Trt. CCW	Continuous Strip Casting CCW	Semi-Continuous Ingot Casting CCW	Shot Casting CCW	Alkaline Cleaning Spent Baths	Alkaline Cleaning Rinsewater	Total Subcategory
44. methylene chloride	ND	ND	NA	ND	NA	NA	NA	ND
45. methyl chloride	ND	ND	NA	ND	NA	NA	NA	ND
46. methyl bromide	ND	ND	NA	ND	NA	NA	NA	ND
47. bromoform	ND	ND	NA	ND	NA	NA	NA	ND
48. dichlorobromomethane	ND	ND	NA	ND	NA	NA	NA	ND
49. trichlorofluoromethane	ND	ND	NA	ND	NA	NA	NA	ND
50. dichlorodifluoromethane	ND	ND	NA	ND	NA	NA	NA	ND
51. chlorodibromomethane	ND	ND	NA	ND	NA	NA	NA	ND
52. hexachlorobutadiene	ND	ND	NA	ND	ND	ND	ND	ND
53. hexachlorocyclopentadiene	ND	ND	NA	ND	ND	ND	ND	ND
54. isophorone	ND	ND	NA	ND	ND	ND	ND	ND
55. naphthalene	ND	ND	NA	ND	ND	ND	ND	ND
56. nitrobenzene	ND	ND	NA	ND	ND	ND	ND	ND
57. 2-nitrophenol	ND	ND	NA	ND	ND	ND	ND	ND
58. 4-nitrophenol	ND	ND	NA	ND	ND	ND	ND	ND
59. 2,4-dinitrophenol	ND	ND	NA	ND	ND	ND	ND	ND
60. 4,6-dinitro-o-cresol	ND	ND	NA	ND	ND	ND	ND	ND
61. N-nitrosodimethylamine	ND	ND	NA	ND	ND	ND	ND	ND
62. N-nitrosodiphenylamine	ND	ND	NA	ND	ND	ND	ND	ND
63. N-nitrosodi-n-propylamine	ND	ND	NA	ND	ND	ND	ND	ND
64. pentachlorophenol	ND	ND	NA	ND	ND	ND	ND	ND
65. phenol	ND	ND	NA	ND	RG	ND	ND	SU
66. bis(2-ethylhexyl) phthalate	ND	ND	NA	ND	ND	RG	ND	SU
67. butyl benzyl phthalate	ND	ND	NA	ND	ND	ND	ND	ND
68. di-n-butyl phthalate	ND	ND	NA	ND	ND	ND	ND	ND
69. di-n-octyl phthalate	ND	ND	NA	ND	ND	ND	ND	ND
70. diethyl phthalate	ND	ND	NA	ND	ND	ND	ND	ND
71. dimethyl phthalate	ND	ND	NA	ND	ND	ND	ND	ND
72. benzo(a)anthracene	ND	ND	NA	ND	ND	ND	ND	ND
73. benzo(a)pyrene	ND	ND	NA	ND	ND	ND	ND	ND
74. 3,4-benzofluoranthene	ND	ND	NA	ND	ND	ND	ND	ND
75. benzo(k)fluoranthene	ND	ND	NA	ND	ND	ND	ND	ND
76. chrysene	ND	ND	NA	ND	ND	ND	ND	ND
77. acenaphthylene	ND	ND	NA	ND	ND	ND	ND	ND
78. anthracene	ND	ND	NA	ND	ND	ND	ND	ND
79. benzo(ghi)perylene	ND	ND	NA	ND	ND	ND	ND	ND
80. fluorene	ND	ND	NA	ND	ND	ND	ND	ND
81. phenanthrene	ND	ND	NA	ND	ND	RG	ND	SU
82. dibenzo(a,h)anthracene	ND	ND	NA	ND	ND	ND	ND	ND
83. indeno(1,2,3-c,d)pyrene	ND	ND	NA	ND	ND	ND	ND	ND
84. pyrene	ND	ND	NA	ND	ND	ND	ND	ND
85. tetrachloroethylene	ND	ND	NA	NA	ND	NA	NA	ND
86. toluene	ND	ND	NA	NA	ND	NA	NA	ND

Table VI-3 (Continued)

PRIORITY POLLUTANT DISPOSITION
LEAD-TIN-BISMUTH FORMING SUBCATEGORY

	Pollutant	Rolling Spent Emulsions	Extrusion Press and Soln. Heat Trt. CCW	Continuous Strip Casting CCW	Semi-Continuous Ingot Casting CCW	Shot Casting CCW	Alkaline Cleaning Spent Baths	Alkaline Cleaning Rinsewater	Total Subcategory
87.	trichloroethylene	ND	ND	NA	ND	NA	NA	NA	ND
88.	vinyl chloride	ND	ND	NA	ND	NA	NA	NA	ND
89.	aldrin	NA	NA	NA	NA	NA	NA	NA	NA
90.	dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
91.	chlordane	NA	NA	NA	NA	NA	NA	NA	NA
92.	4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
93.	4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
94.	4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
95.	alpha-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA
96.	beta-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA
97.	endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA
98.	endrin	NA	NA	NA	NA	NA	NA	NA	NA
99.	endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA
100.	heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
101.	heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
102.	alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA
103.	beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
104.	gamma-BHC	NA	NA	NA	NA	NA	NA	NA	NA
105.	delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
106.	PCB-1242	NA	NA	NA	NA	NA	NA	NA	NA
107.	PCB-1254	NA	NA	NA	NA	NA	NA	NA	NA
108.	PCB-1221	NA	NA	NA	NA	NA	NA	NA	NA
109.	PCB-1232	NA	NA	NA	NA	NA	NA	NA	NA
110.	PCB-1248	NA	NA	NA	NA	NA	NA	NA	NA
111.	PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA
112.	PCB-1016	NA	NA	NA	NA	NA	NA	NA	NA
113.	toxaphene	NA	NA	NA	NA	NA	NA	NA	NA
114.	antimony	ND	ND	NA	NT	RG	RG	RG	RG
115.	arsenic	ND	ND	NA	NT	NT	NT	NT	NT
116.	asbestos	NA	NA	NA	NA	NA	NA	NA	NA
117.	beryllium	ND	NT	ND	ND	ND	ND	ND	NT
118.	cadmium	ND	NT	NT	ND	ND	ND	ND	NT
119.	chromium	ND	RG	NT	ND	ND	ND	ND	SU
120.	copper	NT	NT	RG	ND	ND	NT	NT*	SU
121.	cyanide	NA	RG	NA	ND	ND	ND	ND	SU
122.	lead	RG	RG	RG	RG	RG	RG	RG	RG
123.	mercury	ND	ND	NA	ND	NT	ND	NT	NT
124.	nickel	NT	NT	NT	ND	ND	ND	ND	NT*
125.	selenium	ND	ND	NA	ND	ND	ND	ND	ND
126.	silver	ND	ND	NA	ND	ND	ND	ND	ND
127.	thallium	ND	ND	NA	ND	ND	ND	ND	ND
128.	zinc	RG	ND	RG	NT	NT	NT	NT*	SU
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA	NA	NA	NA

Table VI-3 (Continued)

PRIORITY POLLUTANT DISPOSITION
LEAD-TIN-BISMUTH FORMING SUBCATEGORY

*These pollutant parameters could also have been eliminated from further consideration due to presence in a small number of sources (SU).

Key: NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

Table VI-4

PRIORITY POLLUTANT DISPOSITION
MAGNESIUM FORMING SUBCATEGORY

	Pollutant	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Total Subcategory
1.	acenaphthene	NA	ND	ND
2.	acrolein	NA	ND	ND
3.	acrylonitrile	NA	ND	ND
4.	benzene	NA	ND	ND
5.	benzidine	NA	ND	ND
6.	carbon tetrachloride	NA	ND	ND
7.	chlorobenzene	NA	ND	ND
8.	1,2,4-trichlorobenzene	NA	ND	ND
9.	hexachlorobenzene	NA	ND	ND
10.	1,2-dichloroethane	NA	ND	ND
11.	1,1,1-trichloroethane	NA	NT	NT
12.	hexachloroethane	NA	ND	ND
13.	1,1-dichloroethane	NA	ND	ND
14.	1,1,2-trichloroethane	NA	ND	ND
15.	1,1,2,2-tetrachloroethane	NA	ND	ND
16.	chloroethane	NA	ND	ND
17.	bis(chloromethyl) ether	NA	ND	ND
18.	bis(2-chloroethyl) ether	NA	ND	ND
19.	2-chloroethyl vinyl ether	NA	ND	ND
20.	2-chloronaphthalene	NA	ND	ND
21.	2,4,6-trichlorophenol	NA	ND	ND
22.	parachlorometa cresol	NA	ND	ND
23.	chloroform	NA	ND	ND
24.	2-chlorophenol	NA	ND	ND
25.	1,2-dichlorobenzene	NA	ND	ND
26.	1,3-dichlorobenzene	NA	ND	ND
27.	1,4-dichlorobenzene	NA	ND	ND
28.	3,3'-dichlorobenzidine	NA	ND	ND
29.	1,1-dichloroethylene	NA	ND	ND
30.	1,2-trans-dichloroethylene	NA	ND	ND
31.	2,4-dichlorophenol	NA	ND	ND
32.	1,2-dichloropropane	NA	ND	ND
33.	1,2-dichloropropylene	NA	ND	ND
34.	2,4-dimethylphenol	NA	ND	ND
35.	2,4-dinitrotoluene	NA	ND	ND
36.	2,6-dinitrotoluene	NA	ND	ND
37.	1,2-diphenylhydrazine	NA	ND	ND
38.	ethylbenzene	NA	ND	ND
39.	fluoranthene	NA	ND	ND
40.	4-chlorophenyl phenyl ether	NA	ND	ND
41.	4-bromophenyl phenyl ether	NA	ND	ND
42.	bis(2-chloroisopropyl) ether	NA	ND	ND
43.	bis(2-chloroethoxy) methane	NA	ND	ND

Table VI-4 (Continued)

PRIORITY POLLUTANT DISPOSITION
MAGNESIUM FORMING SUBCATEGORY

Pollutant	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Total Subcategory
44. methylene chloride	NA	NT	NT
45. methyl chloride	NA	ND	ND
46. methyl bromide	NA	ND	ND
47. bromoform	NA	ND	ND
48. dichlorobromomethane	NA	ND	ND
49. trichlorofluoromethane	NA	ND	ND
50. dichlorodifluoromethane	NA	ND	ND
51. chlorodibromomethane	NA	ND	ND
52. hexachlorobutadiene	NA	ND	ND
53. hexachlorocyclopentadiene	NA	ND	ND
54. isophorone	NA	ND	ND
55. naphthalene	NA	ND	ND
56. nitrobenzene	NA	ND	ND
57. 2-nitrophenol	NA	NT	NT
58. 4-nitrophenol	NA	ND	ND
59. 2,4-dinitrophenol	NA	ND	ND
60. 4,6-dinitro-o-cresol	NA	ND	ND
61. N-nitrosodimethylamine	NA	ND	ND
62. N-nitrosodiphenylamine	NA	ND	ND
63. N-nitrosodi-n-propylamine	NA	ND	ND
64. pentachlorophenol	NA	ND	ND
65. phenol	NA	NT	NT
66. bis(2-ethylhexyl) phthalate	NA	ND	ND
67. butyl benzyl phthalate	NA	ND	ND
68. di-n-butyl phthalate	NA	ND	ND
69. di-n-octyl phthalate	NA	ND	ND
70. diethyl phthalate	NA	ND	ND
71. dimethyl phthalate	NA	ND	ND
72. benzo(a)anthracene	NA	ND	ND
73. benzo(a)pyrene	NA	ND	ND
74. 3,4-benzofluoranthene	NA	ND	ND
75. benzo(k)fluoranthene	NA	ND	ND
76. chrysene	NA	ND	ND
77. acenaphthylene	NA	ND	ND
78. anthracene	NA	ND	ND
79. benzo(ghi)perylene	NA	ND	ND
80. fluorene	NA	ND	ND
81. phenanthrene	NA	ND	ND
82. dibenzo(a,h)anthracene	NA	ND	ND
83. indeno(1,2,3-c,d)pyrene	NA	ND	ND
84. pyrene	NA	ND	ND
85. tetrachloroethylene	NA	ND	ND
86. toluene	NA	ND	ND

Table VI-4 (Continued)

PRIORITY POLLUTANT DISPOSITION
MAGNESIUM FORMING SUBCATEGORY

	Pollutant	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Total Subcategory
87.	trichloroethylene	NA	ND	ND
88.	vinyl chloride	NA	ND	ND
89.	aldrin	NA	NA	NA
90.	dieldrin	NA	NA	NA
91.	chlordane	NA	NA	NA
92.	4,4'-DDT	NA	NA	NA
93.	4,4'-DDE	NA	NA	NA
94.	4,4'-DDD	NA	NA	NA
95.	alpha-endosulfan	NA	NA	NA
96.	beta-endosulfan	NA	NA	NA
97.	endosulfan sulfate	NA	NA	NA
98.	endrin	NA	NA	NA
99.	endrin aldehyde	NA	NA	NA
100.	heptachlor	NA	NA	NA
101.	heptachlor epoxide	NA	NA	NA
102.	alpha-BHC	NA	NA	NA
103.	beta-BHC	NA	NA	NA
104.	gamma-BHC	NA	NA	NA
105.	delta-BHC	NA	NA	NA
106.	PCB-1242	NA	NA	NA
107.	PCB-1254	NA	NA	NA
108.	PCB-1221	NA	NA	NA
109.	PCB-1232	NA	NA	NA
110.	PCB-1248	NA	NA	NA
111.	PCB-1260	NA	NA	NA
112.	PCB-1016	NA	NA	NA
113.	toxaphene	NA	NA	NA
114.	antimony	NT	ND	NT
115.	arsenic	ND	ND	ND
116.	asbestos	NA	NA	NA
117.	beryllium	RG	NT	SU
118.	cadmium	ND	ND	ND
119.	chromium	RG	RG	RG
120.	copper	ND	ND	ND
121.	cyanide	RG	ND	SU
122.	lead	RG	ND	SU
123.	mercury	NT	NT	NT
124.	nickel	ND	ND	ND
125.	selenium	ND	ND	ND
126.	silver	NT	ND	NT
127.	thallium	ND	ND	ND
128.	zinc	RG	RG	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA

Table VI-4 (Continued)

PRIORITY POLLUTANT DISPOSITION
MAGNESIUM FORMING SUBCATEGORY

Key: NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

Table VI-5

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

	Pollutant	Rolling Spent Emulsions	Rolling CCW	Extrusion Press and Soln. Heat - Trt. CCW	Extrusion Press Hydraulic Fluid Leakage	Forging CCW	Tube Reducing Spent Lubricants	Powder Production Wet Atomization Wastewater	Vacuum Melting Steam Condensate
1.	acenaphthene	ND	ND	ND	ND	ND	ND	NA	ND
2.	acrolein	ND	ND	ND	ND	ND	ND	NA	ND
3.	acrylonitrile	ND	ND	ND	ND	ND	ND	NA	ND
4.	benzene	ND	ND	ND	ND	ND	ND	NA	ND
5.	benzidine	ND	ND	NQ	RG	ND	ND	NA	NQ
6.	carbon tetrachloride	ND	ND	ND	ND	ND	ND	NA	ND
7.	chlorobenzene	ND	ND	ND	ND	ND	ND	NA	ND
8.	1,2,4-trichlorobenzene	ND	ND	ND	ND	ND	ND	NA	ND
9.	hexachlorobenzene	ND	ND	ND	ND	ND	ND	NA	ND
10.	1,2-dichloroethane	ND	ND	ND	ND	ND	ND	NA	ND
11.	1,1,1-trichloroethane	RG	RG	ND	RG	RG	RG	NA	NT
12.	hexachloroethane	ND	ND	ND	NT	ND	ND	NA	NT
13.	1,1-dichloroethane	ND	SU	ND	NT	ND	ND	NA	ND
14.	1,1,2-trichloroethane	ND	ND	ND	ND	ND	ND	NA	ND
15.	1,1,2,2-tetrachloroethane	ND	ND	ND	ND	ND	ND	NA	ND
16.	chloroethane	ND	ND	ND	ND	ND	ND	NA	ND
17.	bis(chloromethyl) ether	ND	ND	ND	ND	ND	ND	NA	ND
18.	bis(2-chloroethyl) ether	ND	ND	ND	ND	ND	ND	NA	ND
19.	2-chloroethyl vinyl ether	ND	ND	ND	ND	ND	ND	NA	ND
20.	2-chloronaphthalene	ND	ND	ND	ND	ND	ND	NA	ND
21.	2,4,6-trichlorophenol	ND	ND	ND	ND	ND	ND	NA	ND
22.	parachlorometa cresol	ND	NT*	ND	RG	ND	ND	NA	ND
23.	chloroform	ND	ND	ND	ND	NT	ND	NA	ND
24.	2-chlorophenol	ND	ND	ND	ND	ND	ND	NA	ND
25.	1,2-dichlorobenzene	ND	ND	ND	ND	ND	ND	NA	ND
26.	1,3-dichlorobenzene	ND	ND	ND	ND	ND	ND	NA	ND
27.	1,4-dichlorobenzene	ND	ND	ND	ND	ND	ND	NA	ND
28.	3,3'-dichlorobenzidine	ND	ND	ND	RG	ND	ND	NA	ND
29.	1,1-dichloroethylene	ND	NT*	ND	ND	ND	ND	NA	ND
30.	1,2-trans-dichloroethylene	ND	ND	ND	ND	ND	ND	NA	ND
31.	2,4-dichlorophenol	ND	ND	ND	ND	ND	ND	NA	ND
32.	1,2-dichloropropane	ND	ND	ND	ND	ND	ND	NA	ND
33.	1,2-dichloropropylene	ND	ND	ND	ND	ND	ND	NA	ND
34.	2,4-dimethylphenol	ND	NT*	ND	ND	ND	ND	NA	ND
35.	2,4-dinitrotoluene	ND	ND	ND	ND	ND	ND	NA	ND
36.	2,6-dinitrotoluene	ND	ND	NT	RG	ND	ND	NA	NT
37.	1,2-diphenylhydrazine	ND	ND	ND	NT	ND	ND	NA	ND
38.	ethylbenzene	ND	ND	ND	ND	ND	ND	NA	ND
39.	fluoranthene	ND	ND	ND	NT	ND	ND	NA	ND
40.	4-chlorophenyl phenyl ether	ND	ND	ND	ND	ND	ND	NA	ND
41.	4-bromophenyl phenyl ether	ND	ND	ND	ND	ND	ND	NA	ND
42.	bis(2-chloroisopropyl) ether	ND	ND	ND	ND	ND	ND	NA	ND
43.	bis(2-chloroethoxy) methane	ND	ND	ND	NT	ND	ND	NA	ND

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

	Pollutant	Rolling Spent Emulsions	Rolling CCW	Extrusion Press and Soln. Heat - Trt. CCW	Extrusion Press Hydraulic Fluid Leakage	Forging CCW	Tube Reducing Spent Lubricants	Powder Production Wet Atomization Wastewater	Vacuum Melting Steam Condensate
44.	methylene chloride	RG	SU	ND	ND	NT	RG	NA	ND
45.	methyl chloride	ND	ND	ND	ND	ND	ND	NA	ND
46.	methyl bromide	ND	ND	ND	ND	ND	ND	NA	ND
47.	bromoform	ND	ND	ND	ND	ND	ND	NA	ND
48.	dichlorobromomethane	ND	ND	ND	ND	ND	ND	NA	ND
49.	trichlorofluoromethane	ND	ND	ND	ND	ND	ND	NA	ND
50.	dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	NA	ND
51.	chlorodibromomethane	ND	ND	ND	ND	ND	ND	NA	ND
52.	hexachlorobutadiene	ND	ND	ND	ND	ND	ND	NA	ND
53.	hexachlorocyclopentadiene	ND	ND	ND	ND	ND	ND	NA	ND
54.	isophorone	ND	ND	ND	ND	ND	ND	NA	ND
55.	naphthalene	RG	SU	ND	NT	ND	ND	NA	NT
56.	nitrobenzene	ND	ND	ND	ND	ND	ND	NA	ND
57.	2-nitrophenol	ND	ND	ND	ND	ND	ND	NA	ND
58.	4-nitrophenol	ND	ND	ND	ND	ND	ND	NA	ND
59.	2,4-dinitrophenol	ND	ND	ND	ND	ND	ND	NA	ND
60.	4,6-dinitro-o-cresol	ND	ND	ND	ND	ND	ND	NA	ND
61.	N-nitrosodimethylamine	ND	ND	NQ	NT	ND	ND	NA	ND
62.	N-nitrosodiphenylamine	ND	ND	ND	ND	ND	RG	NA	ND
63.	N-nitrosodi-n-propylamine	ND	ND	SU	SU	ND	ND	NA	TS
64.	pentachlorophenol	RG	ND	ND	ND	ND	ND	NA	ND
65.	phenol	RG	SU	ND	NQ	ND	ND	NA	ND
66.	bis(2-ethylhexyl) phthalate	ND	SU	NT	NT	NT	ND	NA	NT
67.	butyl benzyl phthalate	ND	NT	ND	NT	ND	ND	NA	ND
68.	di-n-butyl phthalate	ND	NT	ND	ND	ND	ND	NA	ND
69.	di-n-octyl phthalate	ND	ND	NT	ND	ND	ND	NA	ND
70.	diethyl phthalate	ND	ND	ND	NT	ND	ND	NA	NQ
71.	dimethyl phthalate	ND	ND	ND	NT	ND	ND	NA	ND
72.	benzo(a)anthracene	ND	ND	ND	NQ	ND	ND	NA	ND
73.	benzo(a)pyrene	ND	ND	ND	RG	ND	ND	NA	ND
74.	3,4-benzofluoranthene	ND	ND	ND	ND	ND	ND	NA	ND
75.	benzo(k)fluoranthene	ND	ND	ND	NQ	ND	ND	NA	ND
76.	chrysene	ND	ND	ND	NQ	ND	ND	NA	ND
77.	acenaphthylene	ND	ND	ND	ND	ND	ND	NA	ND
78.	anthracene	ND	ND	ND	NT	ND	ND	NA	ND
79.	benzo(ghi)perylene	ND	ND	ND	ND	ND	ND	NA	ND
80.	fluorene	ND	ND	ND	ND	ND	ND	NA	ND
81.	phenanthrene	RG	ND	ND	NT	ND	ND	NA	ND
82.	dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	NA	ND
83.	indeno(1,2,3-c,d)pyrene	ND	ND	ND	NT	ND	ND	NA	ND
84.	pyrene	ND	ND	ND	NT	ND	ND	NA	ND
85.	tetrachloroethylene	ND	ND	ND	ND	ND	ND	NA	ND
86.	toluene	ND	ND	ND	ND	NT	ND	NA	ND

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

Pollutant	Rolling Spent Emulsions	Rolling CCW	Extrusion Press and Soln. Heat - Trt. CCW	Extrusion Press Hydraulic Fluid Leakage	Forging CCW	Tube Reducing Spent Lubricants	Powder Production Wet Atomization Wastewater	Vacuum Melting Steam Condensate
87. trichloroethylene	ND	ND	ND	ND	ND	ND	NA	ND
88. vinyl chloride	ND	ND	ND	ND	ND	ND	NA	ND
89. aldrin	NA	NA	NA	NA	NA	NA	NA	NA
90. dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
91. chlordane	NA	NA	NA	NA	NA	NA	NA	NA
92. 4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
93. 4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
94. 4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
95. alpha-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA
96. beta-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA
97. endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA
98. endrin	NA	NA	NA	NA	NA	NA	NA	NA
99. endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA
100. heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
101. heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
102. alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA
103. beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
104. gamma-BHC	NA	NA	NA	NA	NA	NA	NA	NA
105. delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
106. PCB-1242	NA	NA	NA	NA	NA	NA	NA	NA
107. PCB-1254	NA	NA	NA	NA	NA	NA	NA	NA
108. PCB-1221	NA	NA	NA	NA	NA	NA	NA	NA
109. PCB-1232	NA	NA	NA	NA	NA	NA	NA	NA
110. PCB-1248	NA	NA	NA	NA	NA	NA	NA	NA
111. PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA
112. PCB-1016	NA	NA	NA	NA	NA	NA	NA	NA
113. toxaphene	NA	NA	NA	NA	NA	NA	NA	NA
114. antimony	NT	NT	ND	ND	NT	ND	ND	ND
115. arsenic	NT	NT*	ND	ND	NT	NT	ND	ND
116. asbestos	NA	NA	NA	NA	NA	NA	NA	NA
117. beryllium	ND	NT	ND	ND	NT	ND	ND	ND
118. cadmium	RG	RG	ND	ND	RG	ND	ND	ND
119. chromium	RG	RG	RG	ND	RG	RG	RG	ND
120. copper	RG	SU	NT	RG	RG	RG	RG	NT
121. cyanide	ND	ND	ND	ND	ND	ND	ND	ND
122. lead	RG	SU	ND	RG	RG	RG	ND	ND
123. mercury	ND	ND	ND	ND	ND	ND	ND	ND
124. nickel	RG	RG	NT	RG	RG	RG	RG	ND
125. selenium	ND	ND	ND	ND	ND	ND	ND	ND
126. silver	NT	ND	ND	ND	ND	NT	NT	ND
127. thallium	ND	ND	ND	ND	ND	ND	NT	ND
128. zinc	RG	RG	NT	RG	NT	RG	RG	NT
129. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA	NA	NA	NA

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

	Pollutant	Annealing and Soln. Heat Trt. CCW	Surface Trt. Spent Bath	Surface Trt. Rinsewater	Ammonia Rinsewater	Alkaline Cleaning Spent Baths	Alkaline Cleaning Rinsewater	Molten Salt Rinsewater	Sawing or Grinding Spent Emulsions
1.	acenaphthene	ND	NA	ND	ND	ND	ND	NA	SU
2.	acrolein	ND	NA	ND	ND	ND	ND	NA	ND
3.	acrylonitrile	ND	NA	ND	ND	ND	ND	NA	ND
4.	benzene	ND	NA	ND	ND	ND	ND	NA	NT*
5.	benzidine	ND	NA	RG	ND	ND	ND	NA	ND
6.	carbon tetrachloride	ND	NA	ND	ND	ND	ND	NA	ND
7.	chlorobenzene	ND	NA	ND	ND	ND	ND	NA	ND
8.	1,2,4-trichlorobenzene	ND	NA	ND	ND	ND	ND	NA	ND
9.	hexachlorobenzene	ND	NA	ND	ND	ND	ND	NA	ND
10.	1,2-dichloroethane	ND	NA	ND	ND	ND	ND	NA	ND
11.	1,1,1-trichloroethane	ND	NA	RG	ND	ND	ND	NA	RG
12.	hexachloroethane	ND	NA	NT	ND	ND	ND	NA	ND
13.	1,1-dichloroethane	ND	NA	ND	ND	ND	ND	NA	SU
14.	1,1,2-trichloroethane	ND	NA	ND	ND	ND	ND	NA	ND
15.	1,1,2,2-tetrachloroethane	ND	NA	ND	ND	ND	ND	NA	ND
16.	chloroethane	ND	NA	ND	ND	ND	ND	NA	ND
17.	bis(chloromethyl) ether	ND	NA	ND	ND	ND	ND	NA	ND
18.	bis(2-chloroethyl) ether	ND	NA	ND	ND	ND	ND	NA	ND
19.	2-chloroethyl vinyl ether	ND	NA	ND	ND	ND	ND	NA	ND
20.	2-chloronaphthalene	ND	NA	ND	ND	ND	ND	NA	ND
21.	2,4,6-trichlorophenol	ND	NA	ND	ND	ND	ND	NA	ND
22.	parachlorometa cresol	ND	NA	ND	ND	ND	ND	NA	SU
23.	chloroform	ND	NA	ND	ND	ND	ND	NA	ND
24.	2-chlorophenol	ND	NA	ND	ND	ND	ND	NA	ND
25.	1,2-dichlorobenzene	ND	NA	ND	ND	ND	ND	NA	ND
26.	1,3-dichlorobenzene	ND	NA	ND	ND	ND	ND	NA	ND
27.	1,4-dichlorobenzene	ND	NA	ND	ND	ND	ND	NA	ND
28.	3,3'-dichlorobenzidine	ND	NA	ND	ND	ND	ND	NA	ND
29.	1,1-dichloroethylene	ND	NA	ND	ND	ND	ND	NA	ND
30.	1,2-trans-dichloroethylene	ND	NA	ND	ND	ND	ND	NA	ND
31.	2,4-dichlorophenol	ND	NA	ND	ND	ND	ND	NA	ND
32.	1,2-dichloropropane	ND	NA	ND	ND	ND	ND	NA	ND
33.	1,2-dichloropropylene	ND	NA	ND	ND	ND	ND	NA	ND
34.	2,4-dimethylphenol	ND	NA	ND	ND	ND	ND	NA	SU
35.	2,4-dinitrotoluene	ND	NA	ND	ND	ND	ND	NA	ND
36.	2,6-dinitrotoluene	ND	NA	NT	ND	ND	ND	NA	ND
37.	1,2-diphenylhydrazine	ND	NA	ND	ND	ND	ND	NA	NT
38.	ethylbenzene	ND	NA	ND	ND	ND	ND	NA	ND
39.	fluoranthene	ND	NA	ND	ND	ND	ND	NA	SU
40.	4-chlorophenyl phenyl ether	ND	NA	ND	ND	ND	ND	NA	ND
41.	4-bromophenyl phenyl ether	ND	NA	ND	ND	ND	ND	NA	ND
42.	bis(2-chloroisopropyl) ether	ND	NA	ND	ND	ND	ND	NA	ND
43.	bis(2-chloroethoxy) methane	ND	NA	NQ	ND	ND	ND	NA	ND

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

	Pollutant	Annealing and Soln. Heat Trt. CCW	Surface Trt. Spent Bath	Surface Trt. Rinsewater	Ammonia Rinsewater	Alkaline Cleaning Spent Baths	Alkaline Cleaning Rinsewater	Molten Salt Rinsewater	Sawing or Grinding Spent Emulsions
44.	methylene chloride	RG	NA	ND	RG	RG	NT	NA	RG
45.	methyl chloride	ND	NA	ND	ND	ND	ND	NA	ND
46.	methyl bromide	ND	NA	ND	ND	ND	ND	NA	ND
47.	bromoform	ND	NA	ND	ND	ND	ND	NA	ND
48.	dichlorobromomethane	ND	NA	ND	ND	ND	ND	NA	ND
49.	~~trichlorofluoromethane~~	ND	NA	ND	ND	ND	ND	NA	ND
50.	dichlorodifluoromethane	ND	NA	ND	ND	ND	ND	NA	ND
51.	chlorodibromomethane	ND	NA	ND	ND	ND	ND	NA	ND
52.	hexachlorobutadiene	ND	NA	ND	ND	ND	ND	NA	ND
53.	hexachlorocyclopentadiene	ND	NA	ND	ND	ND	ND	NA	ND
54.	isophorone	ND	NA	ND	ND	ND	ND	NA	ND
55.	naphthalene	ND	NA	NT	ND	ND	ND	NA	SU
56.	nitrobenzene	ND	NA	ND	ND	ND	ND	NA	ND
57.	2-nitrophenol	ND	NA	ND	ND	ND	ND	NA	SU
58.	4-nitrophenol	ND	NA	ND	ND	ND	NT	NA	SU
59.	2,4-dinitrophenol	ND	NA	ND	ND	ND	ND	NA	ND
60.	4,6-dinitro-o-cresol	ND	NA	ND	ND	ND	ND	NA	SU
61.	N-nitrosodimethylamine	ND	NA	NT	ND	ND	ND	NA	ND
62.	N-nitrosodiphenylamine	ND	NA	RG	ND	ND	ND	NA	ND
63.	N-nitrosodi-n-propylamine	ND	NA	SU	ND	ND	ND	NA	ND
64.	pentachlorophenol	ND	NA	ND	ND	ND	ND	NA	SU
65.	phenol	ND	NA	ND	ND	ND	NT*	NA	RG
66.	bis(2-ethylhexyl) phthalate	NT	NA	NT	ND	ND	NT	NA	SU
67.	butyl benzyl phthalate	ND	NA	NT	ND	ND	ND	NA	ND
68.	di-n-butyl phthalate	ND	NA	ND	RG	ND	ND	NA	NT
69.	di-n-octyl phthalate	ND	NA	ND	ND	ND	ND	NA	NT
70.	diethyl phthalate	ND	NA	NQ	ND	ND	ND	NA	ND
71.	dimethyl phthalate	ND	NA	NT	ND	ND	ND	NA	ND
72.	benzo(a)anthracene	ND	NA	ND	ND	ND	ND	NA	ND
73.	benzo(a)pyrene	ND	NA	ND	ND	ND	ND	NA	ND
74.	3,4-benzofluoranthene	ND	NA	ND	ND	ND	ND	NA	ND
75.	benzo(k)fluoranthene	ND	NA	ND	ND	ND	ND	NA	ND
76.	chrysene	ND	NA	ND	ND	ND	ND	NA	ND
77.	acenaphthylene	ND	NA	ND	ND	ND	ND	NA	NT
78.	anthracene	ND	NA	ND	ND	ND	ND	NA	ND
79.	benzo(ghi)perylene	ND	NA	ND	ND	ND	ND	NA	ND
80.	fluorene	ND	NA	ND	ND	ND	ND	NA	SU
81.	phenanthrene	ND	NA	NT	ND	ND	ND	NA	RG
82.	dibenzo(a,h)anthracene	ND	NA	ND	ND	ND	ND	NA	ND
83.	indeno(1,2,3-c,d)pyrene	ND	NA	ND	ND	ND	ND	NA	ND
84.	pyrene	ND	NA	ND	ND	ND	ND	NA	SU
85.	tetrachloroethylene	ND	NA	ND	ND	ND	ND	NA	ND
86.	toluene	ND	NA	ND	ND	ND	ND	NA	ND

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

Pollutant	Annealing and Soln. Heat Trt. CCW	Surface Trt. Spent Bath	Surface Trt. Rinsewater	Ammonia Rinsewater	Alkaline Cleaning Spent Baths	Alkaline Cleaning Rinsewater	Molten Salt Rinsewater	Sawing or Grinding Spent Emulsions
87. trichloroethylene	ND	NA	ND	ND	ND	ND	NA	ND
88. vinyl chloride	ND	NA	ND	ND	ND	ND	NA	ND
89. aldrin	NA	NA	NA	NA	NA	NA	NA	NA
90. dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
91. chlordane	NA	NA	NA	NA	NA	NA	NA	NA
92. 4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
93. 4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
94. 4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
95. alpha-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA
96. beta-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA
97. endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA
98. endrin	NA	NA	NA	NA	NA	NA	NA	NA
99. endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA
100. heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
101. heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
102. alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA
103. beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
104. gamma-BHC	NA	NA	NA	NA	NA	NA	NA	NA
105. delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA
106. PCB-1242	NA	NA	NA	NA	NA	NA	NA	NA
107. PCB-1254	NA	NA	NA	NA	NA	NA	NA	NA
108. PCB-1221	NA	NA	NA	NA	NA	NA	NA	NA
109. PCB-1232	NA	NA	NA	NA	NA	NA	NA	NA
110. PCB-1248	NA	NA	NA	NA	NA	NA	NA	NA
111. PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA
112. PCB-1016	NA	NA	NA	NA	NA	NA	NA	NA
113. toxaphene	NA	NA	NA	NA	NA	NA	NA	NA
114. antimony	ND	SU	NT	NT	NT	NT*	NT*	NT*
115. arsenic	ND	SU	NT	NT	NT	NT*	NT	NT
116. asbestos	NA	NA	NA	NA	NA	NA	NA	NA
117. beryllium	ND	SU	NT	ND	NT	NT	NT	NT
118. cadmium	ND	RG	SU	ND	SU	NT	RG	SU
119. chromium	RG	RG	RG	RG	RG	RG	RG	RG
120. copper	RG	RG	RG	RG	RG	RG	RG	RG
121. cyanide	ND	ND	ND	ND	ND	ND	ND	SU
122. lead	ND	RG	RG	RG	SU	SU	RG	RG
123. mercury	ND	NT*	NT*	ND	ND	ND	ND	ND
124. nickel	RG	RG	RG	RG	RG	RG	RG	RG
125. selenium	ND	NT*	ND	NT	SU	ND	NT	SU
126. silver	NT	SU	NT*	NT	NT	ND	NT	NT
127. thallium	NT	NT	NT*	ND	NT	ND	NT	NT
128. zinc	RG	RG	RG	RG	RG	SU	RG	RG
129. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA	NA	NA	NA

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

	Pollutant	WAPC Control Blowdown	Forging Press Hydraulic Fluid Leakage	Total Subcategory
1.	acenaphthene	NA	ND	SU
2.	acrolein	NA	ND	ND
3.	acrylonitrile	NA	ND	ND
4.	benzene	NA	ND	NT*
5.	benzidine	NA	ND	SU
6.	carbon tetrachloride	NA	ND	ND
7.	chlorobenzene	NA	ND	ND
8.	1,2,4-trichlorobenzene	NA	ND	ND
9.	hexachlorobenzene	NA	ND	ND
10.	1,2-dichloroethane	NA	ND	ND
11.	1,1,1-trichloroethane	NA	RG	RG
12.	hexachloroethane	NA	ND	NT
13.	1,1-dichloroethane	NA	RG	SU
14.	1,1,2-trichloroethane	NA	ND	ND
15.	1,1,2,2-tetrachloroethane	NA	ND	ND
16.	chloroethane	NA	ND	ND
17.	bis(chloromethyl) ether	NA	ND	ND
18.	bis(2-chloroethyl) ether	NA	ND	ND
19.	2-chloroethyl vinyl ether	NA	ND	ND
20.	2-chloronaphthalene	NA	ND	ND
21.	2,4,6-trichlorophenol	NA	ND	ND
22.	parachlorometa cresol	NA	ND	SU
23.	chloroform	NA	ND	NT*
24.	2-chlorophenol	NA	ND	ND
25.	1,2-dichlorobenzene	NA	ND	ND
26.	1,3-dichlorobenzene	NA	ND	ND
27.	1,4-dichlorobenzene	NA	ND	ND
28.	3,3'-dichlorobenzidine	NA	ND	SU
29.	1,1-dichloroethylene	NA	ND	NT*
30.	1,2-trans-dichloroethylene	NA	ND	ND
31.	2,4-dichlorophenol	NA	ND	ND
32.	1,2-dichloropropane	NA	ND	ND
33.	1,2-dichloropropylene	NA	ND	ND
34.	2,4-dimethylphenol	NA	ND	SU
35.	2,4-dinitrotoluene	NA	ND	ND
36.	2,6-dinitrotoluene	NA	ND	SU
37.	1,2-diphenylhydrazine	NA	ND	NT
38.	ethylbenzene	NA	ND	ND
39.	fluoranthene	NA	ND	SU
40.	4-chlorophenyl phenyl ether	NA	ND	ND
41.	4-bromophenyl phenyl ether	NA	ND	ND
42.	bis(2-chloroisopropyl) ether	NA	ND	ND
43.	bis(2-chloroethoxy) methane	NA	ND	NT

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

	Pollutant	WAPC Control Blowdown	Forging Press Hydraulic Fluid Leakage	Total Subcategory
44.	methylene chloride	NA	NT	SU
45.	methyl chloride	NA	ND	ND
46.	methyl bromide	NA	ND	ND
47.	bromoform	NA	ND	ND
48.	dichlorobromomethane	NA	ND	ND
49.	trichlorofluoromethane	NA	ND	ND
50.	dichlorodifluoromethane	NA	ND	ND
51.	chlorodibromomethane	NA	ND	ND
52.	hexachlorobutadiene	NA	ND	ND
53.	hexachlorocyclopentadiene	NA	ND	ND
54.	isophorone	NA	ND	ND
55.	naphthalene	NA	ND	SU
56.	nitrobenzene	NA	ND	ND
57.	2-nitrophenol	NA	ND	SU
58.	4-nitrophenol	NA	ND	SU
59.	2,4-dinitrophenol	NA	ND	ND
60.	4,6-dinitro-o-cresol	NA	ND	SU
61.	N-nitrosodimethylamine	NA	ND	NT
62.	N-nitrosodiphenylamine	NA	ND	SU
63.	N-nitrosodi-n-propylamine	NA	ND	SU
64.	pentachlorophenol	NA	ND	SU
65.	phenol	NA	ND	SU
66.	bis(2-ethylhexyl) phthalate	NA	RG	SU
67.	butyl benzyl phthalate	NA	ND	NT
68.	di-n-butyl phthalate	NA	ND	SU
69.	di-n-octyl phthalate	NA	ND	NT
70.	diethyl phthalate	NA	ND	NT
71.	dimethyl phthalate	NA	ND	NT
72.	benzo(a)anthracene	NA	ND	NQ
73.	benzo(a)pyrene	NA	ND	SU
74.	3,4-benzofluoranthene	NA	ND	ND
75.	benzo(k)fluoranthene	NA	ND	NQ
76.	chrysene	NA	ND	NQ
77.	acenaphthylene	NA	ND	NT
78.	anthracene	NA	ND	NT
79.	benzo(ghi)perylene	NA	ND	ND
80.	fluorene	NA	ND	SU
81.	phenanthrene	NA	RG	SU
82.	dibenzo(a,h)anthracene	NA	ND	ND
83.	indeno(1,2,3-c,d)pyrene	NA	ND	NT
84.	pyrene	NA	ND	SU
85.	tetrachloroethylene	NA	ND	ND
86.	toluene	NA	ND	NT

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

	Pollutant	WAPC Control Blowdown	Forging Press Hydraulic Fluid Leakage	Total Subcategory
87.	trichloroethylene	NA	ND	ND
88.	vinyl chloride	NA	ND	ND
89.	aldrin	NA	NA	NA
90.	dieldrin	NA	NA	NA
91.	chlordane	NA	NA	NA
92.	4,4'-DDT	NA	NA	NA
93.	4,4'-DDE	NA	NA	NA
94.	4,4'-DDD	NA	NA	NA
95.	alpha-endosulfan	NA	NA	NA
96.	beta-endosulfan	NA	NA	NA
97.	endosulfan sulfate	NA	NA	NA
98.	endrin	NA	NA	NA
99.	endrin aldehyde	NA	NA	NA
100.	heptachlor	NA	NA	NA
101.	heptachlor epoxide	NA	NA	NA
102.	alpha-BHC	NA	NA	NA
103.	beta-BHC	NA	NA	NA
104.	gamma-BHC	NA	NA	NA
105.	delta-BHC	NA	NA	NA
106.	PCB-1242	NA	NA	NA
107.	PCB-1254	NA	NA	NA
108.	PCB-1221	NA	NA	NA
109.	PCB-1232	NA	NA	NA
110.	PCB-1248	NA	NA	NA
111.	PCB-1260	NA	NA	NA
112.	PCB-1016	NA	NA	NA
113.	toxaphene	NA	NA	NA
114.	antimony	NT	ND	SU
115.	arsenic	NT	ND	SU
116.	asbestos	NA	NA	NA
117.	beryllium	ND	ND	NT
118.	cadmium	NT	NT	RG
119.	chromium	RG	RG	RG
120.	copper	RG	RG	RG
121.	cyanide	ND	NA	SU
122.	lead	ND	RG	RG
123.	mercury	ND	ND	NT*
124.	nickel	RG	RG	RG
125.	selenium	ND	ND	SU
126.	silver	ND	ND	SU
127.	thallium	ND	ND	NT*
128.	zinc	NT	RG	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA

Table VI-5 (Continued)

PRIORITY POLLUTANT DISPOSITION
NICKEL-COBALT FORMING SUBCATEGORY

*These pollutant parameters could also have been eliminated from further consideration due to presence in a small number of sources (SU).

Key:
- NA - Not Analyzed
- ND - Never Detected
- NQ - Never Found Above Their Analytical Quantification
- NT - Detected Below Levels Achievable by Treatment
- SU - Detected in a Small Number of Sources
- RG - Considered for Regulation

Table VI-6

PRIORITY POLLUTANT DISPOSITION
PRECIOUS METALS FORMING SUBCATEGORY

	Pollutant	Rolling Spent Emulsions	Drawing Spent Emulsions	Shot Casting CCW	Semi-Continuous and Continuous Casting CCW	Surface Trt. Rinsewater
1.	acenaphthene	ND	ND	ND	NA	NA
2.	acrolein	ND	ND	ND	NA	NA
3.	acrylonitrile	ND	ND	ND	NA	NA
4.	benzene	RG	ND	ND	NA	NA
5.	benzidine	ND	ND	ND	NA	NA
6.	carbon tetrachloride	ND	ND	ND	NA	NA
7.	chlorobenzene	ND	ND	ND	NA	NA
8.	1,2,4-trichlorobenzene	ND	ND	ND	NA	NA
9.	hexachlorobenzene	ND	ND	ND	NA	NA
10.	1,2-dichloroethane	ND	ND	ND	NA	NA
11.	1,1,1-trichloroethane	ND	RG	RG	NA	NA
12.	hexachloroethane	ND	ND	ND	NA	NA
13.	1,1-dichloroethane	ND	ND	ND	NA	NA
14.	1,1,2-trichloroethane	ND	ND	ND	NA	NA
15.	1,1,2,2-tetrachloroethane	ND	ND	ND	NA	NA
16.	chloroethane	ND	ND	ND	NA	NA
17.	bis(chloromethyl) ether	ND	ND	ND	NA	NA
18.	bis(2-chloroethyl) ether	ND	ND	ND	NA	NA
19.	2-chloroethyl vinyl ether	ND	ND	ND	NA	NA
20.	2-chloronaphthalene	ND	ND	ND	NA	NA
21.	2,4,6-trichlorophenol	ND	ND	ND	NA	NA
22.	parachlorometa cresol	ND	ND	ND	NA	NA
23.	chloroform	ND	ND	ND	NA	NA
24.	2-chlorophenol	ND	ND	ND	NA	NA
25.	1,2-dichlorobenzene	ND	ND	ND	NA	NA
26.	1,3-dichlorobenzene	ND	ND	ND	NA	NA
27.	1,4-dichlorobenzene	ND	ND	ND	NA	NA
28.	3,3'-dichlorobenzidine	ND	ND	ND	NA	NA
29.	1,1-dichloroethylene	ND	ND	ND	NA	NA
30.	1,2-trans-dichloroethylene	ND	ND	ND	NA	NA
31.	2,4-dichlorophenol	ND	ND	ND	NA	NA
32.	1,2-dichloropropane	ND	ND	ND	NA	NA
33.	1,2-dichloropropylene	ND	ND	ND	NA	NA
34.	2,4-dimethylphenol	ND	ND	ND	NA	NA
35.	2,4-dinitrotoluene	ND	ND	ND	NA	NA
36.	2,6-dinitrotoluene	ND	ND	ND	NA	NA
37.	1,2-diphenylhydrazine	ND	ND	ND	NA	NA
38.	ethylbenzene	ND	ND	ND	NA	NA
39.	fluoranthene	ND	ND	ND	NA	NA
40.	4-chlorophenyl phenyl ether	ND	ND	ND	NA	NA
41.	4-bromophenyl phenyl ether	ND	ND	ND	NA	NA
42.	bis(2-chloroisopropyl) ether	ND	ND	ND	NA	NA
43.	bis(2-chloroethoxy) methane	ND	ND	ND	NA	NA

Table VI-6 (Continued)

PRIORITY POLLUTANT DISPOSITION
PRECIOUS METALS FORMING SUBCATEGORY

	Pollutant	Rolling Spent Emulsions	Drawing Spent Emulsions	Shot Casting CCW	Semi-Continuous and Continuous Casting CCW	Surface Trt. Rinsewater
44.	methylene chloride	RG	RG	NT	NA	NA
45.	methyl chloride	ND	ND	ND	NA	NA
46.	methyl bromide	ND	ND	ND	NA	NA
47.	bromoform	ND	ND	ND	NA	NA
48.	dichlorobromomethane	ND	ND	ND	NA	NA
49.	trichlorofluoromethane	ND	ND	ND	NA	NA
50.	dichlorodifluoromethane	ND	ND	ND	NA	NA
51.	chlorodibromomethane	ND	ND	ND	NA	NA
52.	hexachlorobutadiene	ND	ND	ND	NA	NA
53.	hexachlorocyclopentadiene	ND	ND	ND	NA	NA
54.	isophorone	ND	ND	ND	NA	NA
55.	naphthalene	ND	ND	ND	NA	NA
56.	nitrobenzene	ND	ND	ND	NA	NA
57.	2-nitrophenol	ND	ND	ND	NA	NA
58.	4-nitrophenol	ND	ND	ND	NA	NA
59.	2,4-dinitrophenol	ND	ND	ND	NA	NA
60.	4,6-dinitro-o-cresol	ND	ND	ND	NA	NA
61.	N-nitrosodimethylamine	ND	ND	ND	NA	NA
62.	N-nitrosodiphenylamine	ND	ND	ND	NA	NA
63.	N-nitrosodi-n-propylamine	ND	ND	ND	NA	NA
64.	pentachlorophenol	ND	ND	ND	NA	NA
65.	phenol	ND	ND	ND	NA	NA
66.	bis(2-ethylhexyl) phthalate	ND	ND	ND	NA	NA
67.	butyl benzyl phthalate	ND	ND	ND	NA	NA
68.	di-n-butyl phthalate	ND	ND	ND	NA	NA
69.	di-n-octyl phthalate	ND	ND	ND	NA	NA
70.	diethyl phthalate	ND	ND	ND	NA	NA
71.	dimethyl phthalate	ND	ND	ND	NA	NA
72.	benzo(a)anthracene	ND	ND	ND	NA	NA
73.	benzo(a)pyrene	ND	ND	ND	NA	NA
74.	3,4-benzofluoranthene	ND	ND	ND	NA	NA
75.	benzo(k)fluoranthene	ND	ND	ND	NA	NA
76.	chrysene	ND	ND	ND	NA	NA
77.	acenaphthylene	ND	ND	ND	NA	NA
78.	anthracene	ND	ND	ND	NA	NA
79.	benzo(ghi)perylene	ND	ND	ND	NA	NA
80.	fluorene	ND	ND	ND	NA	NA
81.	phenanthrene	ND	ND	ND	NA	NA
82.	dibenzo(a,h)anthracene	ND	ND	ND	NA	NA
83.	indeno(1,2,3-c,d)pyrene	ND	ND	ND	NA	NA
84.	pyrene	ND	ND	ND	NA	NA
85.	tetrachloroethylene	ND	ND	ND	NA	NA
86.	toluene	ND	ND	NT	NA	NA

Table VI-6 (Continued)

PRIORITY POLLUTANT DISPOSITION
PRECIOUS METALS FORMING SUBCATEGORY

Pollutant	Rolling Spent Emulsions	Drawing Spent Emulsions	Shot Casting CCW	Semi-Continuous and Continuous Casting CCW	Surface Trt. Rinsewater
87. trichloroethylene	RG	ND	NT	NA	NA
88. vinyl chloride	ND	ND	ND	NA	NA
89. aldrin	NA	NA	NA	NA	NA
90. dieldrin	NA	NA	NA	NA	NA
91. chlordane	NA	NA	NA	NA	NA
92. 4,4'-DDT	NA	NA	NA	NA	NA
93. 4,4'-DDE	NA	NA	NA	NA	NA
94. 4,4'-DDD	NA	NA	NA	NA	NA
95. alpha-endosulfan	NA	NA	NA	NA	NA
96. beta-endosulfan	NA	NA	NA	NA	NA
97. endosulfan sulfate	NA	NA	NA	NA	NA
98. endrin	NA	NA	NA	NA	NA
99. endrin aldehyde	NA	NA	NA	NA	NA
100. heptachlor	NA	NA	NA	NA	NA
101. heptachlor epoxide	NA	NA	NA	NA	NA
102. alpha-BHC	NA	NA	NA	NA	NA
103. beta-BHC	NA	NA	NA	NA	NA
104. gamma-BHC	NA	NA	NA	NA	NA
105. delta-BHC	NA	NA	NA	NA	NA
106. PCB-1242	NA	NA	NA	NA	NA
107. PCB-1254	NA	NA	NA	NA	NA
108. PCB-1221	NA	NA	NA	NA	NA
109. PCB-1232	NA	NA	NA	NA	NA
110. PCB-1248	NA	NA	NA	NA	NA
111. PCB-1260	NA	NA	NA	NA	NA
112. PCB-1016	NA	NA	NA	NA	NA
113. toxaphene	NA	NA	NA	NA	NA
114. antimony	NT	ND	NT	ND	NT
115. arsenic	NT	ND	ND	ND	NT
116. asbestos	NA	NA	NA	NA	NA
117. beryllium	ND	ND	ND	ND	ND
118. cadmium	RG	ND	RG	RG	RG
119. chromium	RG	ND	ND	NT	NT
120. copper	RG	RG	RG	RG	RG
121. cyanide	ND	ND	ND	RG	ND
122. lead	RG	RG	NT	RG	RG
123. mercury	NT	ND	ND	NT	ND
124. nickel	RG	RG	NT	NT	RG
125. selenium	ND	ND	ND	ND	ND
126. silver	RG	RG	NT	NT	RG
127. thallium	ND	ND	ND	ND	NT
128. zinc	RG	RG	RG	NT	RG
129. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA

Table VI-6 (Continued)

PRIORITY POLLUTANT DISPOSITION
PRECIOUS METALS FORMING SUBCATEGORY

Pollutant	Alkaline Cleaning Prebonding Wastewater	Tumbling or Burnishing Wastewater	Sawing or Grinding Spent Emulsions	Pressure Bonding CCW	Total Subcategory
1. acenaphthene	ND	ND	ND	NA	ND
2. acrolein	ND	ND	ND	NA	ND
3. acrylonitrile	ND	ND	ND	NA	ND
4. benzene	ND	ND	ND	NA	SU
5. benzidine	ND	ND	ND	NA	ND
6. carbon tetrachloride	ND	ND	ND	NA	ND
7. chlorobenzene	ND	ND	ND	NA	ND
8. 1,2,4-trichlorobenzene	ND	ND	ND	NA	ND
9. hexachlorobenzene	ND	ND	ND	NA	ND
10. 1,2-dichloroethane	ND	ND	ND	NA	ND
11. 1,1,1-trichloroethane	RG	RG	ND	NA	SU
12. hexachloroethane	ND	ND	ND	NA	ND
13. 1,1-dichloroethane	ND	ND	ND	NA	ND
14. 1,1,2-trichloroethane	ND	ND	ND	NA	ND
15. 1,1,2,2-tetrachloroethane	ND	ND	ND	NA	ND
16. chloroethane	ND	NT	ND	NA	NT
17. bis(chloromethyl) ether	ND	ND	ND	NA	ND
18. bis(2-chloroethyl) ether	ND	ND	ND	NA	ND
19. 2-chloroethyl vinyl ether	ND	ND	ND	NA	ND
20. 2-chloronaphthalene	ND	ND	ND	NA	ND
21. 2,4,6-trichlorophenol	ND	ND	ND	NA	ND
22. parachlorometa cresol	ND	ND	ND	NA	ND
23. chloroform	ND	ND	ND	NA	ND
24. 2-chlorophenol	ND	ND	ND	NA	ND
25. 1,2-dichlorobenzene	ND	ND	ND	NA	ND
26. 1,3-dichlorobenzene	ND	ND	ND	NA	ND
27. 1,4-dichlorobenzene	ND	ND	ND	NA	ND
28. 3,3'-dichlorobenzidine	ND	ND	ND	NA	ND
29. 1,1-dichloroethylene	ND	ND	ND	NA	ND
30. 1,2-trans-dichloroethylene	ND	ND	ND	NA	ND
31. 2,4-dichlorophenol	ND	ND	ND	NA	ND
32. 1,2-dichloropropane	ND	ND	ND	NA	ND
33. 1,2-dichloropropylene	ND	ND	ND	NA	ND
34. 2,4-dimethylphenol	ND	ND	ND	NA	ND
35. 2,4-dinitrotoluene	ND	ND	ND	NA	ND
36. 2,6-dinitrotoluene	ND	ND	ND	NA	ND
37. 1,2-diphenylhydrazine	ND	ND	ND	NA	ND
38. ethylbenzene	ND	ND	ND	NA	ND
39. fluoranthene	ND	ND	ND	NA	ND
40. 4-chlorophenyl phenyl ether	ND	ND	ND	NA	ND
41. 4-bromophenyl phenyl ether	ND	ND	ND	NA	ND
42. bis(2-chloroisopropyl) ether	ND	ND	ND	NA	ND
43. bis(2-chloroethoxy) methane	ND	ND	ND	NA	ND

Table VI-6 (Continued)

PRIORITY POLLUTANT DISPOSITION
PRECIOUS METALS FORMING SUBCATEGORY

	Pollutant	Alkaline Cleaning Prebonding Wastewater	Tumbling or Burnishing Wastewater	Sawing or Grinding Spent Emulsions	Pressure Bonding CCW	Total Subcategory
44.	methylene chloride	SU	NT	RG	NA	SU
45.	methyl chloride	SU	ND	ND	NA	SU
46.	methyl bromide	ND	ND	ND	NA	ND
47.	bromoform	ND	ND	ND	NA	ND
48.	dichlorobromomethane	ND	ND	ND	NA	ND
49.	trichlorofluoromethane	ND	NT	ND	NA	NT
50.	dichlorodifluoromethane	ND	ND	ND	NA	ND
51.	chlorodibromomethane	ND	ND	ND	NA	ND
52.	hexachlorobutadiene	ND	ND	ND	NA	ND
53.	hexachlorocyclopentadiene	ND	ND	ND	NA	ND
54.	isophorone	ND	ND	ND	NA	ND
55.	naphthalene	ND	ND	ND	NA	ND
56.	nitrobenzene	ND	ND	ND	NA	ND
57.	2-nitrophenol	ND	ND	ND	NA	ND
58.	4-nitrophenol	ND	ND	ND	NA	ND
59.	2,4-dinitrophenol	ND	ND	ND	NA	ND
60.	4,6-dinitro-o-cresol	ND	ND	ND	NA	ND
61.	N-nitrosodimethylamine	ND	ND	ND	NA	ND
62.	N-nitrosodiphenylamine	ND	ND	ND	NA	ND
63.	N-nitrosodi-n-propylamine	ND	ND	ND	NA	ND
64.	pentachlorophenol	ND	ND	ND	NA	ND
65.	phenol	NT	ND	NT	NA	NT
66.	bis(2-ethylhexyl) phthalate	NT	ND	ND	NA	NT
67.	butyl benzyl phthalate	ND	ND	ND	NA	ND
68.	di-n-butyl phthalate	ND	ND	ND	NA	ND
69.	di-n-octyl phthalate	ND	ND	ND	NA	ND
70.	diethyl phthalate	ND	ND	ND	NA	ND
71.	dimethyl phthalate	ND	ND	ND	NA	ND
72.	benzo(a)anthracene	ND	ND	ND	NA	ND
73.	benzo(a)pyrene	ND	ND	ND	NA	ND
74.	3,4-benzofluoranthene	ND	ND	ND	NA	ND
75.	benzo(k)fluoranthene	ND	ND	ND	NA	ND
76.	chrysene	ND	ND	ND	NA	ND
77.	acenaphthylene	ND	ND	ND	NA	ND
78.	anthracene	ND	ND	ND	NA	ND
79.	benzo(ghi)perylene	ND	ND	ND	NA	ND
80.	fluorene	ND	ND	ND	NA	ND
81.	phenanthrene	ND	ND	ND	NA	ND
82.	dibenzo(a,h)anthracene	ND	ND	ND	NA	ND
83.	indeno(1,2,3-c,d)pyrene	ND	ND	ND	NA	ND
84.	pyrene	ND	ND	ND	NA	ND
85.	tetrachloroethylene	ND	ND	ND	NA	ND
86.	toluene	SU	SU	ND	NA	SU

Table VI-6 (Continued)

PRIORITY POLLUTANT DISPOSITION
PRECIOUS METALS FORMING SUBCATEGORY

	Pollutant	Alkaline Cleaning Prebonding Wastewater	Tumbling or Burnishing Wastewater	Sawing or Grinding Spent Emulsions	Pressure Bonding CCW	Total Subcategory
87.	trichloroethylene	NT	ND	ND	NA	SU
88.	vinyl chloride	ND	ND	ND	NA	ND
89.	aldrin	NA	NA	NA	NA	NA
90.	dieldrin	NA	NA	NA	NA	NA
91.	chlordane	NA	NA	NA	NA	NA
92.	4,4'-DDT	NA	NA	NA	NA	NA
93.	4,4'-DDE	NA	NA	NA	NA	NA
94.	4,4'-DDD	NA	NA	NA	NA	NA
95.	alpha-endosulfan	NA	NA	NA	NA	NA
96.	beta-endosulfan	NA	NA	NA	NA	NA
97.	endosulfan sulfate	NA	NA	NA	NA	NA
98.	endrin	NA	NA	NA	NA	NA
99.	endrin aldehyde	NA	NA	NA	NA	NA
100.	heptachlor	NA	NA	NA	NA	NA
101.	heptachlor epoxide	NA	NA	NA	NA	NA
102.	alpha-BHC	NA	NA	NA	NA	NA
103.	beta-BHC	NA	NA	NA	NA	NA
104.	gamma-BHC	NA	NA	NA	NA	NA
105.	delta-BHC	NA	NA	NA	NA	NA
106.	PCB-1242	NA	NA	NA	NA	NA
107.	PCB-1254	NA	NA	NA	NA	NA
108.	PCB-1221	NA	NA	NA	NA	NA
109.	PCB-1232	NA	NA	NA	NA	NA
110.	PCB-1248	NA	NA	NA	NA	NA
111.	PCB-1260	NA	NA	NA	NA	NA
112.	PCB-1016	NA	NA	NA	NA	NA
113.	toxaphene	NA	NA	NA	NA	NA
114.	antimony	ND	NT	ND	ND	NT
115.	arsenic	ND	ND	ND	ND	NT
116.	asbestos	NA	NA	NA	NA	NA
117.	beryllium	ND	ND	ND	ND	ND
118.	cadmium	RG	RG	ND	RG	RG
119.	chromium	RG	RG	ND	NT	SU
120.	copper	RG	RG	RG	RG	RG
121.	cyanide	RG	TS	ND	ND	RG
122.	lead	RG	RG	RG	RG	RG
123.	mercury	ND	NT	ND	ND	NT
124.	nickel	RG	RG	NT	RG	RG
125.	selenium	ND	ND	ND	ND	ND
126.	silver	SU	RG	ND	NT	RG
127.	thallium	ND	ND	ND	ND	NT
128.	zinc	RG	RG	RG	RG	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA

Table VI-6 (Continued)

PRIORITY POLLUTANT DISPOSITION
PRECIOUS METALS FORMING SUBCATEGORY

Key:
NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

Table VI-7

PRIORITY POLLUTANT DISPOSITION
REFRACTORY METALS FORMING SUBCATEGORY

	Pollutant	Extrusion Press Hydraulic Fluid Leakage	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Alkaline Cleaning Spent Baths	Molten Salt Rinsewater	Tumbling or Burnishing Wastewater	Sawing or Grinding CCW	Dye Penetrant Testing Wastewater
1.	acenaphthene	ND	NA	NA	NA	ND	ND	ND	ND
2.	acrolein	ND	NA	NA	NA	ND	ND	ND	ND
3.	acrylonitrile	ND	NA	NA	NA	ND	ND	ND	ND
4.	benzene	ND	NA	NA	NA	ND	ND	ND	ND
5.	benzidine	ND	NA	NA	NA	ND	ND	ND	ND
6.	carbon tetrachloride	ND	NA	NA	NA	ND	ND	ND	ND
7.	chlorobenzene	ND	NA	NA	NA	ND	ND	ND	ND
8.	1,2,4-trichlorobenzene	ND	NA	NA	NA	ND	ND	ND	ND
9.	hexachlorobenzene	ND	NA	NA	NA	ND	ND	ND	ND
10.	1,2-dichloroethane	ND	NA	NA	NA	ND	ND	ND	ND
11.	1,1,1-trichloroethane	RG	NA	NA	NA	NQ	RG	RG	RG
12.	hexachloroethane	ND	NA	NA	NA	ND	ND	ND	ND
13.	1,1-dichloroethane	ND	NA	NA	NA	ND	ND	ND	NQ
14.	1,1,2-trichloroethane	ND	NA	NA	NA	ND	ND	ND	ND
15.	1,1,2,2-tetrachloroethane	ND	NA	NA	NA	ND	ND	NQ	ND
16.	chloroethane	ND	NA	NA	NA	ND	ND	ND	ND
17.	bis(chloromethyl) ether	ND	NA	NA	NA	ND	ND	ND	ND
18.	bis(2-chloroethyl) ether	ND	NA	NA	NA	ND	ND	ND	ND
19.	2-chloroethyl vinyl ether	ND	NA	NA	NA	ND	ND	ND	ND
20.	2-chloronaphthalene	ND	NA	NA	NA	ND	ND	ND	ND
21.	2,4,6-trichlorophenol	ND	NA	NA	NA	ND	ND	ND	ND
22.	parachlorometa cresol	ND	NA	NA	NA	ND	ND	ND	ND
23.	chloroform	ND	NA	NA	NA	NQ	NT	ND	NQ
24.	2-chlorophenol	NQ	NA	NA	NA	ND	ND	ND	ND
25.	1,2-dichlorobenzene	ND	NA	NA	NA	ND	ND	ND	ND
26.	1,3-dichlorobenzene	ND	NA	NA	NA	ND	ND	ND	ND
27.	1,4-dichlorobenzene	ND	NA	NA	NA	ND	ND	ND	ND
28.	3,3'-dichlorobenzidine	ND	NA	NA	NA	ND	ND	ND	ND
29.	1,1-dichloroethylene	ND	NA	NA	NA	ND	ND	NQ	NQ
30.	1,2-trans-dichloroethylene	ND	NA	NA	NA	ND	ND	ND	ND
31.	2,4-dichlorophenol	ND	NA	NA	NA	ND	ND	ND	ND
32.	1,2-dichloropropane	ND	NA	NA	NA	ND	ND	ND	ND
33.	1,2-dichloropropylene	ND	NA	NA	NA	ND	ND	ND	ND
34.	2,4-dimethylphenol	ND	NA	NA	NA	ND	ND	NT	ND
35.	2,4-dinitrotoluene	ND	NA	NA	NA	ND	ND	ND	RG
36.	2,6-dinitrotoluene	ND	NA	NA	NA	ND	ND	ND	ND
37.	1,2-diphenylhydrazine	ND	NA	NA	NA	ND	ND	ND	ND
38.	ethylbenzene	ND	NA	NA	NA	ND	ND	ND	ND
39.	fluoranthene	ND	NA	NA	NA	ND	ND	NQ	RG
40.	4-chlorophenyl phenyl ether	ND	NA	NA	NA	ND	ND	ND	ND
41.	4-bromophenyl phenyl ether	ND	NA	NA	NA	ND	ND	ND	ND
42.	bis(2-chloroisopropyl) ether	ND	NA	NA	NA	ND	ND	ND	ND
43.	bis(2-chloroethoxy) methane	ND	NA	NA	NA	ND	ND	ND	ND

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Table VI-7 (Continued)

PRIORITY POLLUTANT DISPOSITION
REFRACTORY METALS FORMING SUBCATEGORY

	Pollutant	Extrusion Press Hydraulic Fluid Leakage	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Alkaline Cleaning Spent Baths	Molten Salt Rinsewater	Tumbling or Burnishing Wastewater	Sawing or Grinding CCW	Dye Penetrant Testing Wastewater
44.	methylene chloride	RG	NA	NA	NA	NQ	NT	NT	NQ
45.	methyl chloride	ND	NA	NA	NA	ND	ND	ND	ND
46.	methyl bromide	ND	NA	NA	NA	ND	ND	ND	ND
47.	bromoform	ND	NA	NA	NA	ND	ND	ND	ND
48.	dichlorobromomethane	ND	NA	NA	NA	ND	ND	ND	ND
49.	trichlorofluoromethane	ND	NA	NA	NA	ND	ND	ND	ND
50.	dichlorodifluoromethane	ND	NA	NA	NA	ND	ND	ND	ND
51.	chlorodibromomethane	ND	NA	NA	NA	ND	ND	ND	ND
52.	hexachlorobutadiene	ND	NA	NA	NA	ND	ND	ND	ND
53.	hexachlorocyclopentadiene	ND	NA	NA	NA	ND	ND	ND	ND
54.	isophorone	ND	NA	NA	NA	ND	ND	ND	ND
55.	naphthalene	ND	NA	NA	NA	ND	NT	NT	RG
56.	nitrobenzene	ND	NA	NA	NA	ND	ND	ND	NT
57.	2-nitrophenol	ND	NA	NA	NA	ND	ND	RG	ND
58.	4-nitrophenol	ND	NA	NA	NA	ND	ND	ND	ND
59.	2,4-dinitrophenol	ND	NA	NA	NA	ND	ND	ND	ND
60.	4,6-dinitro-o-cresol	ND	NA	NA	NA	ND	ND	ND	RG
61.	N-nitrosodimethylamine	ND	NA	NA	NA	ND	ND	ND	ND
62.	N-nitrosodiphenylamine	ND	NA	NA	NA	ND	ND	ND	RG
63.	N-nitrosodi-n-propylamine	ND	NA	NA	NA	ND	ND	RG	ND
64.	pentachlorophenol	ND	NA	NA	NA	ND	ND	ND	ND
65.	phenol	RG	NA	NA	NA	ND	ND	RG	NT
66.	bis(2-ethylhexyl) phthalate	RG	NA	NA	NA	ND	RG	NT	RG
67.	butyl benzyl phthalate	RG	NA	NA	NA	ND	ND	ND	ND
68.	di-n-butyl phthalate	RG	NA	NA	NA	ND	ND	NQ	ND
69.	di-n-octyl phthalate	RG	NA	NA	NA	ND	ND	NQ	NQ
70.	diethyl phthalate	RG	NA	NA	NA	ND	ND	ND	ND
71.	dimethyl phthalate	ND	NA	NA	NA	ND	ND	ND	ND
72.	benzo(a)anthracene	RG	NA	NA	NA	ND	ND	ND	ND
73.	benzo(a)pyrene	ND	NA	NA	NA	ND	ND	ND	ND
74.	3,4-benzofluoranthene	ND	NA	NA	NA	ND	ND	ND	ND
75.	benzo(k)fluoranthene	ND	NA	NA	NA	ND	ND	ND	ND
76.	chrysene	RG	NA	NA	NA	ND	ND	ND	ND
77.	acenaphthylene	ND	NA	NA	NA	ND	ND	ND	RG
78.	anthracene	ND	NA	NA	NA	ND	ND	NQ	RG
79.	benzo(ghi)perylene	ND	NA	NA	NA	ND	ND	ND	ND
80.	fluorene	ND	NA	NA	NA	ND	ND	ND	RG
81.	phenanthrene	ND	NA	NA	NA	ND	ND	ND	RG
82.	dibenzo(a,h)anthracene	ND	NA	NA	NA	ND	ND	ND	ND
83.	indeno(1,2,3-c,d)pyrene	ND	NA	NA	NA	ND	ND	ND	ND
84.	pyrene	ND	NA	NA	NA	ND	ND	NQ	ND
85.	tetrachloroethylene	RG	NA	NA	NA	NT	ND	ND	NQ
86.	toluene	RG	NA	NA	NA	ND	ND	ND	ND

Table VI-7 (Continued)

PRIORITY POLLUTANT DISPOSITION
REFRACTORY METALS FORMING SUBCATEGORY

	Pollutant	Extrusion Press Hydraulic Fluid Leakage	Surface Trt. Spent - Baths	Surface Trt. Rinsewater	Alkaline Cleaning Spent Baths	Molten Salt Rinsewater	Tumbling or Burnishing Wastewater	Sawing or Grinding CCW	Dye Penetrant Testing Wastewater
87.	trichloroethylene	ND	NA	NA	NA	ND	ND	ND	ND
88.	vinyl chloride	ND	NA	NA	NA	ND	ND	ND	ND
89.	aldrin	NA	NA	NA	NA	ND	NA	ND	ND
90.	dieldrin	NA	NA	NA	NA	ND	NA	ND	ND
91.	chlordane	NA	NA	NA	NA	ND	NA	ND	ND
92.	4,4'-DDT	NA	NA	NA	NA	ND	NA	ND	ND
93.	4,4'-DDE	NA	NA	NA	NA	ND	NA	ND	ND
94.	4,4'-DDD	NA	NA	NA	NA	ND	NA	ND	ND
95.	alpha-endosulfan	NA	NA	NA	NA	ND	NA	ND	NQ
96.	beta-endosulfan	NA	NA	NA	NA	ND	NA	ND	ND
97.	endosulfan sulfate	NA	NA	NA	NA	ND	NA	ND	ND
98.	endrin	NA	NA	NA	NA	ND	NA	ND	ND
99.	endrin aldehyde	NA	NA	NA	NA	ND	NA	ND	ND
100.	heptachlor	NA	NA	NA	NA	ND	NA	ND	ND
101.	heptachlor epoxide	NA	NA	NA	NA	ND	NA	ND	ND
102.	alpha-BHC	NA	NA	NA	NA	ND	NA	ND	ND
103.	beta-BHC	NA	NA	NA	NA	ND	NA	ND	ND
104.	gamma-BHC	NA	NA	NA	NA	ND	NA	ND	NQ
105.	delta-BHC	NA	NA	NA	NA	ND	NA	ND	ND
106.	PCB-1242	NA	NA	NA	NA	ND	NA	ND	ND
107.	PCB-1254	NA	NA	NA	NA	ND	NA	ND	ND
108.	PCB-1221	NA	NA	NA	NA	ND	NA	ND	ND
109.	PCB-1232	NA	NA	NA	NA	ND	NA	ND	ND
110.	PCB-1248	NA	NA	NA	NA	ND	NA	ND	ND
111.	PCB-1260	NA	NA	NA	NA	ND	NA	ND	ND
112.	PCB-1016	NA	NA	NA	NA	ND	NA	ND	ND
113.	toxaphene	NA	NA	NA	NA	ND	NA	ND	ND
114.	antimony	NT	ND	NT	NT	NT	ND	NT	ND
115.	arsenic	ND	ND	NT	NT	ND	ND	NT	ND
116.	asbestos	NA	NA	NA	NA	NA	NA	NA	NA
117.	beryllium	NT	ND	NT	NT	NT*	ND	ND	ND
118.	cadmium	RG	RG	NT	NT	ND	RG	NT	ND
119.	chromium	RG	RG	RG	RG	RG	RG	RG	RG
120.	copper	RG	RG	SU	RG	NT	RG	RG	NT
121.	cyanide	NA	ND	ND	NA	ND	ND	RG	ND
122.	lead	RG	ND	RG	RG	SU	SU	RG	NT
123.	mercury	ND	NT	NT	ND	ND	ND	NT	ND
124.	nickel	RG	RG	RG	RG	SU	RG	RG	RG
125.	selenium	ND	ND	ND	NT	ND	ND	ND	ND
126.	silver	RG	RG	NT*	NT	NT	RG	ND	ND
127.	thallium	ND	ND	ND	NT	ND	ND	NT	ND
128.	zinc	RG	RG	NT	ND	NT	RG	RG	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA	NA	NA	NA

Table VI-7 (Continued)

PRIORITY POLLUTANT DISPOSITION
REFRACTORY METALS FORMING SUBCATEGORY

	Pollutant	WAPC Blowdown	Total Subcategory
1.	acenaphthene	ND	ND
2.	acrolein	ND	ND
3.	acrylonitrile	ND	ND
4.	benzene	ND	ND
5.	benzidine	ND	ND
6.	carbon tetrachloride	ND	ND
7.	chlorobenzene	ND	ND
8.	1,2,4-trichlorobenzene	ND	ND
9.	hexachlorobenzene	ND	ND
10.	1,2-dichloroethane	ND	ND
11.	1,1,1-trichloroethane	NT	SU
12.	hexachloroethane	ND	ND
13.	1,1-dichloroethane	ND	NQ
14.	1,1,2-trichloroethane	ND	ND
15.	1,1,2,2-tetrachloroethane	ND	NQ
16.	chloroethane	ND	ND
17.	bis(chloromethyl) ether	ND	ND
18.	bis(2-chloroethyl) ether	ND	ND
19.	2-chloroethyl vinyl ether	ND	ND
20.	2-chloronaphthalene	ND	ND
21.	2,4,6-trichlorophenol	ND	ND
22.	parachlorometa cresol	ND	ND
23.	chloroform	ND	NT
24.	2-chlorophenol	ND	NQ
25.	1,2-dichlorobenzene	ND	ND
26.	1,3-dichlorobenzene	ND	ND
27.	1,4-dichlorobenzene	ND	ND
28.	3,3'-dichlorobenzidine	ND	ND
29.	1,1-dichloroethylene	ND	NQ
30.	1,2-trans-dichloroethylene	ND	ND
31.	2,4-dichlorophenol	ND	ND
32.	1,2-dichloropropane	ND	ND
33.	1,2-dichloropropylene	ND	ND
34.	2,4-dimethylphenol	ND	NT*
35.	2,4-dinitrotoluene	ND	SU
36.	2,6-dinitrotoluene	ND	ND
37.	1,2-diphenylhydrazine	ND	ND
38.	ethylbenzene	ND	ND
39.	fluoranthene	ND	SU
40.	4-chlorophenyl phenyl ether	ND	ND
41.	4-bromophenyl phenyl ether	ND	ND
42.	bis(2-chloroisopropyl) ether	ND	ND
43.	bis(2-chloroethoxy) methane	ND	ND

Table VI-7 (Continued)

PRIORITY POLLUTANT DISPOSITION
REFRACTORY METALS FORMING SUBCATEGORY

	Pollutant	WAPC Blowdown	Total Subcategory
44.	methylene chloride	NT	SU
45.	methyl chloride	ND	ND
46.	methyl bromide	ND	ND
47.	bromoform	ND	ND
48.	dichlorobromomethane	ND	ND
49.	trichlorofluoromethane	ND	ND
50.	dichlorodifluoromethane	ND	ND
51.	chlorodibromomethane	ND	ND
52.	hexachlorobutadiene	ND	ND
53.	hexachlorocyclopentadiene	ND	ND
54.	isophorone	ND	ND
55.	naphthalene	ND	SU
56.	nitrobenzene	ND	NT*
57.	2-nitrophenol	ND	SU
58.	4-nitrophenol	ND	ND
59.	2,4-dinitrophenol	ND	ND
60.	4,6-dinitro-o-cresol	ND	SU
61.	N-nitrosodimethylamine	ND	ND
62.	N-nitrosodiphenylamine	ND	SU
63.	N-nitrosodi-n-propylamine	ND	SU
64.	pentachlorophenol	ND	ND
65.	phenol	ND	SU
66.	bis(2-ethylhexyl) phthalate	ND	SU
67.	butyl benzyl phthalate	ND	SU
68.	di-n-butyl phthalate	ND	SU
69.	di-n-octyl phthalate	ND	SU
70.	diethyl phthalate	ND	SU
71.	dimethyl phthalate	ND	ND
72.	benzo(a)anthracene	ND	SU
73.	benzo(a)pyrene	ND	ND
74.	3,4-benzofluoranthene	ND	ND
75.	benzo(k)fluoranthene	ND	ND
76.	chrysene	ND	SU
77.	acenaphthylene	ND	SU
78.	anthracene	ND	SU
79.	benzo(ghi)perylene	ND	ND
80.	fluorene	ND	SU
81.	phenanthrene	ND	SU
82.	dibenzo(a,h)anthracene	ND	ND
83.	indeno(1,2,3-c,d)pyrene	ND	ND
84.	pyrene	ND	NQ
85.	tetrachloroethylene	ND	SU
86.	toluene	ND	SU

Table VI-7 (Continued)

PRIORITY POLLUTANT DISPOSITION
REFRACTORY METALS FORMING SUBCATEGORY

	Pollutant	WAPC Blowdown	Total Subcategory
87.	trichloroethylene	ND	ND
88.	vinyl chloride	ND	ND
89.	aldrin	NA	ND
90.	dieldrin	NA	ND
91.	chlordane	NA	ND
92.	4,4'-DDT	NA	ND
93.	4,4'-DDE	NA	ND
94.	4,4'-DDD	NA	ND
95.	alpha-endosulfan	NA	NQ
96.	beta-endosulfan	NA	ND
97.	endosulfan sulfate	NA	ND
98.	endrin	NA	ND
99.	endrin aldehyde	NA	ND
100.	heptachlor	NA	ND
101.	heptachlor epoxide	NA	ND
102.	alpha-BHC	NA	ND
103.	beta-BHC	NA	ND
104.	gamma-BHC	NA	NQ
105.	delta-BHC	NA	ND
106.	PCB-1242	NA	ND
107.	PCB-1254	NA	ND
108.	PCB-1221	NA	ND
109.	PCB-1232	NA	ND
110.	PCB-1248	NA	ND
111.	PCB-1260	NA	ND
112.	PCB-1016	NA	ND
113.	toxaphene	NA	ND
114.	antimony	NT	NT*
115.	arsenic	NT	NT*
116.	asbestos	NA	NA
117.	beryllium	ND	NT*
118.	cadmium	ND	SU
119.	chromium	NT	RG
120.	copper	NT	RG
121.	cyanide	ND	SU
122.	lead	RG	RG
123.	mercury	ND	NT*
124.	nickel	NT	RG
125.	selenium	NT	NT
126.	silver	NT	RG
127.	thallium	NT	NT
128.	zinc	NT	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA

Table VI-7 (Continued)

PRIORITY POLLUTANT DISPOSITION
REFRACTORY METALS FORMING SUBCATEGORY

*These pollutant parameters could also have been eliminated from further consideration due to presence in a small number of sources (SU).

Key: NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

Table VI-8

PRIORITY POLLUTANT DISPOSITION
TITANIUM FORMING SUBCATEGORY

	Pollutant	Rolling CCW	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Tumbling Wastewater	Sawing or Grinding Spent Emulsions and Syn. Coolants
1.	acenaphthene	NA	NA	NA	NA	ND
2.	acrolein	NA	NA	NA	NA	ND
3.	acrylonitrile	NA	NA	NA	NA	ND
4.	benzene	NA	NA	NA	NA	ND
5.	benzidine	NA	NA	NA	NA	ND
6.	carbon tetrachloride	NA	NA	NA	NA	NT
7.	chlorobenzene	NA	NA	NA	NA	ND
8.	1,2,4-trichlorobenzene	NA	NA	NA	NA	ND
9.	hexachlorobenzene	NA	NA	NA	NA	ND
10.	1,2-dichloroethane	NA	NA	NA	NA	ND
11.	1,1,1-trichloroethane	NA	NA	NA	NA	ND
12.	hexachloroethane	NA	NA	NA	NA	ND
13.	1,1-dichloroethane	NA	NA	NA	NA	ND
14.	1,1,2-trichloroethane	NA	NA	NA	NA	ND
15.	1,1,2,2-tetrachloroethane	NA	NA	NA	NA	ND
16.	chloroethane	NA	NA	NA	NA	ND
17.	bis(chloromethyl) ether	NA	NA	NA	NA	ND
18.	bis(2-chloroethyl) ether	NA	NA	NA	NA	ND
19.	2-chloroethyl vinyl ether	NA	NA	NA	NA	ND
20.	2-chloronaphthalene	NA	NA	NA	NA	ND
21.	2,4,6-trichlorophenol	NA	NA	NA	NA	ND
22.	parachlorometa cresol	NA	NA	NA	NA	ND
23.	chloroform	NA	NA	NA	NA	ND
24.	2-chlorophenol	NA	NA	NA	NA	ND
25.	1,2-dichlorobenzene	NA	NA	NA	NA	ND
26.	1,3-dichlorobenzene	NA	NA	NA	NA	ND
27.	1,4-dichlorobenzene	NA	NA	NA	NA	ND
28.	3,3'-dichlorobenzidine	NA	NA	NA	NA	ND
29.	1,1-dichloroethylene	NA	NA	NA	NA	ND
30.	1,2-trans-dichloroethylene	NA	NA	NA	NA	ND
31.	2,4-dichlorophenol	NA	NA	NA	NA	ND
32.	1,2-dichloropropane	NA	NA	NA	NA	ND
33.	1,2-dichloropropylene	NA	NA	NA	NA	ND
34.	2,4-dimethylphenol	NA	NA	NA	NA	ND
35.	2,4-dinitrotoluene	NA	NA	NA	NA	ND
36.	2,6-dinitrotoluene	NA	NA	NA	NA	ND
37.	1,2-diphenylhydrazine	NA	NA	NA	NA	ND
38.	ethylbenzene	NA	NA	NA	NA	ND
39.	fluoranthene	NA	NA	NA	NA	ND
40.	4-chlorophenyl phenyl ether	NA	NA	NA	NA	ND
41.	4-bromophenyl phenyl ether	NA	NA	NA	NA	ND
42.	bis(2-chloroisopropyl) ether	NA	NA	NA	NA	ND
43.	bis(2-chloroethoxy) methane	NA	NA	NA	NA	ND

Table VI-8 (Continued)

PRIORITY POLLUTANT DISPOSITION
TITANIUM FORMING SUBCATEGORY

	Pollutant	Rolling CCW	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Tumbling Wastewater	Sawing or Grinding Spent Emulsions and Syn. Coolants
44.	methylene chloride	NA	NA	NA	NA	NT
45.	methyl chloride	NA	NA	NA	NA	ND
46.	methyl bromide	NA	NA	NA	NA	ND
47.	bromoform	NA	NA	NA	NA	ND
48.	dichlorobromomethane	NA	NA	NA	NA	ND
49.	trichlorofluoromethane	NA	NA	NA	NA	ND
50.	dichlorodifluoromethane	NA	NA	NA	NA	ND
51.	chlorodibromomethane	NA	NA	NA	NA	ND
52.	hexachlorobutadiene	NA	NA	NA	NA	ND
53.	hexachlorocyclopentadiene	NA	NA	NA	NA	ND
54.	isophorone	NA	NA	NA	NA	ND
55.	naphthalene	NA	NA	NA	NA	ND
56.	nitrobenzene	NA	NA	NA	NA	ND
57.	2-nitrophenol	NA	NA	NA	NA	ND
58.	4-nitrophenol	NA	NA	NA	NA	ND
59.	2,4-dinitrophenol	NA	NA	NA	NA	ND
60.	4,6-dinitro-o-cresol	NA	NA	NA	NA	ND
61.	N-nitrosodimethylamine	NA	NA	NA	NA	ND
62.	N-nitrosodiphenylamine	NA	NA	NA	NA	ND
63.	N-nitrosodi-n-propylamine	NA	NA	NA	NA	ND
64.	pentachlorophenol	NA	NA	NA	NA	ND
65.	phenol	NA	NA	NA	NA	ND
66.	bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	ND
67.	butyl benzyl phthalate	NA	NA	NA	NA	ND
68.	di-n-butyl phthalate	NA	NA	NA	NA	ND
69.	di-n-octyl phthalate	NA	NA	NA	NA	ND
70.	diethyl phthalate	NA	NA	NA	NA	ND
71.	dimethyl phthalate	NA	NA	NA	NA	ND
72.	benzo(a)anthracene	NA	NA	NA	NA	ND
73.	benzo(a)pyrene	NA	NA	NA	NA	ND
74.	3,4-benzofluoranthene	NA	NA	NA	NA	ND
75.	benzo(k)fluoranthene	NA	NA	NA	NA	ND
76.	chrysene	NA	NA	NA	NA	ND
77.	acenaphthylene	NA	NA	NA	NA	ND
78.	anthracene	NA	NA	NA	NA	ND
79.	benzo(ghi)perylene	NA	NA	NA	NA	ND
80.	fluorene	NA	NA	NA	NA	ND
81.	phenanthrene	NA	NA	NA	NA	ND
82.	dibenzo(a,h)anthracene	NA	NA	NA	NA	ND
83.	indeno(1,2,3-c,d)pyrene	NA	NA	NA	NA	ND
84.	pyrene	NA	NA	NA	NA	ND
85.	tetrachloroethylene	NA	NA	NA	NA	ND
86.	toluene	NA	NA	NA	NA	ND

Table VI-8 (Continued)

PRIORITY POLLUTANT DISPOSITION
TITANIUM FORMING SUBCATEGORY

	Pollutant	Rolling CCW	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Tumbling Wastewater	Sawing or Grinding Spent Emulsions and Syn. Coolants
87.	trichloroethylene	NA	NA	NA	NA	ND
88.	vinyl chloride	NA	NA	NA	NA	ND
89.	aldrin	NA	NA	NA	NA	NA
90.	dieldrin	NA	NA	NA	NA	NA
91.	chlordane	NA	NA	NA	NA	NA
92.	4,4'-DDT	NA	NA	NA	NA	NA
93.	4,4'-DDE	NA	NA	NA	NA	NA
94.	4,4'-DDD	NA	NA	NA	NA	NA
95.	alpha-endosulfan	NA	NA	NA	NA	NA
96.	beta-endosulfan	NA	NA	NA	NA	NA
97.	endosulfan sulfate	NA	NA	NA	NA	NA
98.	endrin	NA	NA	NA	NA	NA
99.	endrin aldehyde	NA	NA	NA	NA	NA
100.	heptachlor	NA	NA	NA	NA	NA
101.	heptachlor epoxide	NA	NA	NA	NA	NA
102.	alpha-BHC	NA	NA	NA	NA	NA
103.	beta-BHC	NA	NA	NA	NA	NA
104.	gamma-BHC	NA	NA	NA	NA	NA
105.	delta-BHC	NA	NA	NA	NA	NA
106.	PCB-1242	NA	NA	NA	NA	NA
107.	PCB-1254	NA	NA	NA	NA	NA
108.	PCB-1221	NA	NA	NA	NA	NA
109.	PCB-1232	NA	NA	NA	NA	NA
110.	PCB-1248	NA	NA	NA	NA	NA
111.	PCB-1260	NA	NA	NA	NA	NA
112.	PCB-1016	NA	NA	NA	NA	NA
113.	toxaphene	NA	NA	NA	NA	NA
114.	antimony	ND	NT	NT	NT	NT
115.	arsenic	ND	RG	NT	ND	NT
116.	asbestos	NA	NA	NA	NA	NA
117.	beryllium	ND	NT	ND	ND	ND
118.	cadmium	ND	RG	SU	ND	ND
119.	chromium	ND	RG	RG	RG	RG
120.	copper	NT	RG	RG	ND	RG
121.	cyanide	RG	NA	NT	RG	RG
122.	lead	RG	RG	RG	RG	RG
123.	mercury	ND	ND	ND	NT	ND
124.	nickel	NT	RG	RG	RG	RG
125.	selenium	ND	NT	ND	ND	RG
126.	silver	ND	NT	NT	ND	NT
127.	thallium	ND	NT	ND	ND	NT
128.	zinc	ND	RG	RG	RG	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA

Table VI-8 (Continued)

PRIORITY POLLUTANT DISPOSITION
TITANIUM FORMING SUBCATEGORY

	Pollutant	WAPC Blowdown	Total Subcategory
1.	acenaphthene	NA	ND
2.	acrolein	NA	ND
3.	acrylonitrile	NA	ND
4.	benzene	NA	ND
5.	benzidine	NA	ND
6.	carbon tetrachloride	NA	NT
7.	chlorobenzene	NA	ND
8.	1,2,4-trichlorobenzene	NA	ND
9.	hexachlorobenzene	NA	ND
10.	1,2-dichloroethane	NA	ND
11.	1,1,1-trichloroethane	NA	ND
12.	hexachloroethane	NA	ND
13.	1,1-dichloroethane	NA	ND
14.	1,1,2-trichloroethane	NA	ND
15.	1,1,2,2-tetrachloroethane	NA	ND
16.	chloroethane	NA	ND
17.	bis(chloromethyl) ether	NA	ND
18.	bis(2-chloroethyl) ether	NA	ND
19.	2-chloroethyl vinyl ether	NA	ND
20.	2-chloronaphthalene	NA	ND
21.	2,4,6-trichlorophenol	NA	ND
22.	parachlorometa cresol	NA	ND
23.	chloroform	NA	ND
24.	2-chlorophenol	NA	ND
25.	1,2-dichlorobenzene	NA	ND
26.	1,3-dichlorobenzene	NA	ND
27.	1,4-dichlorobenzene	NA	ND
28.	3,3'-dichlorobenzidine	NA	ND
29.	1,1-dichloroethylene	NA	ND
30.	1,2-trans-dichloroethylene	NA	ND
31.	2,4-dichlorophenol	NA	ND
32.	1,2-dichloropropane	NA	ND
33.	1,2-dichloropropylene	NA	ND
34.	2,4-dimethylphenol	NA	ND
35.	2,4-dinitrotoluene	NA	ND
36.	2,6-dinitrotoluene	NA	ND
37.	1,2-diphenylhydrazine	NA	ND
38.	ethylbenzene	NA	ND
39.	fluoranthene	NA	ND
40.	4-chlorophenyl phenyl ether	NA	ND
41.	4-bromophenyl phenyl ether	NA	ND
42.	bis(2-chloroisopropyl) ether	NA	ND
43.	bis(2-chloroethoxy) methane	NA	ND

Table VI-8 (Continued)

PRIORITY POLLUTANT DISPOSITION
TITANIUM FORMING SUBCATEGORY

	Pollutant	WAPC Blowdown	Total Subcategory
44.	methylene chloride	NA	NT
45.	methyl chloride	NA	ND
46.	methyl bromide	NA	ND
47.	bromoform	NA	ND
48.	dichlorobromomethane	NA	ND
49.	trichlorofluoromethane	NA	ND
50.	dichlorodifluoromethane	NA	ND
51.	chlorodibromomethane	NA	ND
52.	hexachlorobutadiene	NA	ND
53.	hexachlorocyclopentadiene	NA	ND
54.	isophorone	NA	ND
55.	naphthalene	NA	ND
56.	nitrobenzene	NA	ND
57.	2-nitrophenol	NA	ND
58.	4-nitrophenol	NA	ND
59.	2,4-dinitrophenol	NA	ND
60.	4,6-dinitro-o-cresol	NA	ND
61.	N-nitrosodimethylamine	NA	ND
62.	N-nitrosodiphenylamine	NA	ND
63.	N-nitrosodi-n-propylamine	NA	ND
64.	pentachlorophenol	NA	ND
65.	phenol	NA	ND
66.	bis(2-ethylhexyl) phthalate	NA	ND
67.	butyl benzyl phthalate	NA	ND
68.	di-n-butyl phthalate	NA	ND
69.	di-n-octyl phthalate	NA	ND
70.	diethyl phthalate	NA	ND
71.	dimethyl phthalate	NA	ND
72.	benzo(a)anthracene	NA	ND
73.	benzo(a)pyrene	NA	ND
74.	3,4-benzofluoranthene	NA	ND
75.	benzo(k)fluoranthene	NA	ND
76.	chrysene	NA	ND
77.	acenaphthylene	NA	ND
78.	anthracene	NA	ND
79.	benzo(ghi)perylene	NA	ND
80.	fluorene	NA	ND
81.	phenanthrene	NA	ND
82.	dibenzo(a,h)anthracene	NA	ND
83.	indeno(1,2,3-c,d)pyrene	NA	ND
84.	pyrene	NA	ND
85.	tetrachloroethylene	NA	ND
86.	toluene	NA	ND

Table VI-8 (Continued)

PRIORITY POLLUTANT DISPOSITION
TITANIUM FORMING SUBCATEGORY

	Pollutant	WAPC Blowdown	Total Subcategory
87.	trichloroethylene	NA	ND
88.	vinyl chloride	NA	ND
89.	aldrin	NA	NA
90.	dieldrin	NA	NA
91.	chlordane	NA	NA
92.	4,4'-DDT	NA	NA
93.	4,4'-DDE	NA	NA
94.	4,4'-DDD	NA	NA
95.	alpha-endosulfan	NA	NA
96.	beta-endosulfan	NA	NA
97.	endosulfan sulfate	NA	NA
98.	endrin	NA	NA
99.	endrin aldehyde	NA	NA
100.	heptachlor	NA	NA
101.	heptachlor epoxide	NA	NA
102.	alpha-BHC	NA	NA
103.	beta-BHC	NA	NA
104.	gamma-BHC	NA	NA
105.	delta-BHC	NA	NA
106.	PCB-1242	NA	NA
107.	PCB-1254	NA	NA
108.	PCB-1221	NA	NA
109.	PCB-1232	NA	NA
110.	PCB-1248	NA	NA
111.	PCB-1260	NA	NA
112.	PCB-1016	NA	NA
113.	toxaphene	NA	NA
114.	antimony	NT	NT*
115.	arsenic	NT	SU
116.	asbestos	NA	NA
117.	beryllium	ND	NT*
118.	cadmium	ND	SU
119.	chromium	RG	RG
120.	copper	RG	RG
121.	cyanide	ND	RG
122.	lead	RG	RG
123.	mercury	ND	NT*
124.	nickel	RG	RG
125.	selenium	ND	SU
126.	silver	ND	NT
127.	thallium	ND	NT*
128.	zinc	RG	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA

Table VI-8 (Continued)

PRIORITY POLLUTANT DISPOSITION
TITANIUM FORMING SUBCATEGORY

*These pollutant parameters could also have been eliminated from further consideration due to presence in a small number of sources (SU).

Key: NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

Table VI-9

PRIORITY POLLUTANT DISPOSITION
URANIUM FORMING SUBCATEGORY

	Pollutant	Heat Trt. CCW	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Sawing or Grinding Spent Emulsions	Area Cleaning Wastewater	WAPC Blowdown	Drum Wash Water	Laundry Wastewater	Total Subcategory
1.	acenaphthene	NA	NA	NA	ND	ND	NA	NA	NA	ND
2.	acrolein	NA	NA	NA	ND	ND	NA	NA	NA	ND
3.	acrylonitrile	NA	NA	NA	ND	ND	NA	NA	NA	ND
4.	benzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
5.	benzidine	NA	NA	NA	ND	ND	NA	NA	NA	ND
6.	carbon tetrachloride	NA	NA	NA	ND	ND	NA	NA	NA	ND
7.	chlorobenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
8.	1,2,4-trichlorobenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
9.	hexachlorobenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
10.	1,2-dichloroethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
11.	1,1,1-trichloroethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
12.	hexachloroethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
13.	1,1-dichloroethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
14.	1,1,2-trichloroethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
15.	1,1,2,2-tetrachloroethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
16.	chloroethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
17.	bis(chloromethyl) ether	NA	NA	NA	ND	ND	NA	NA	NA	ND
18.	bis(2-chloroethyl) ether	NA	NA	NA	ND	ND	NA	NA	NA	ND
19.	2-chloroethyl vinyl ether	NA	NA	NA	ND	ND	NA	NA	NA	ND
20.	2-chloronaphthalene	NA	NA	NA	ND	ND	NA	NA	NA	ND
21.	2,4,6-trichlorophenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
22.	parachlorometa cresol	NA	NA	NA	ND	RG	NA	NA	NA	SU
23.	chloroform	NA	NA	NA	ND	ND	NA	NA	NA	ND
24.	2-chlorophenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
25.	1,2-dichlorobenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
26.	1,3-dichlorobenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
27.	1,4-dichlorobenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
28.	3,3'-dichlorobenzidine	NA	NA	NA	ND	ND	NA	NA	NA	ND
29.	1,1-dichloroethylene	NA	NA	NA	ND	ND	NA	NA	NA	ND
30.	1,2-trans-dichloroethylene	NA	NA	NA	ND	ND	NA	NA	NA	ND
31.	2,4-dichlorophenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
32.	1,2-dichloropropane	NA	NA	NA	ND	ND	NA	NA	NA	ND
33.	1,2-dichloropropylene	NA	NA	NA	ND	ND	NA	NA	NA	ND
34.	2,4-dimethylphenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
35.	2,4-dinitrotoluene	NA	NA	NA	ND	ND	NA	NA	NA	ND
36.	2,6-dinitrotoluene	NA	NA	NA	ND	ND	NA	NA	NA	ND
37.	1,2-diphenylhydrazine	NA	NA	NA	ND	ND	NA	NA	NA	ND
38.	ethylbenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
39.	fluoranthene	NA	NA	NA	ND	ND	NA	NA	NA	ND
40.	4-chlorophenyl phenyl ether	NA	NA	NA	ND	ND	NA	NA	NA	ND
41.	4-bromophenyl phenyl ether	NA	NA	NA	ND	ND	NA	NA	NA	ND
42.	bis(2-chloroisopropyl) ether	NA	NA	NA	ND	ND	NA	NA	NA	ND
43.	bis(2-chloroethoxy) methane	NA	NA	NA	ND	ND	NA	NA	NA	ND

Table VI-9 (Continued)

PRIORITY POLLUTANT DISPOSITION
URANIUM FORMING SUBCATEGORY

	Pollutant	Heat Trt. CCW	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Sawing or Grinding Spent Emulsions	Area Cleaning Wastewater	WAPC Blowdown	Drum Wash Water	Laundry Wastewater	Total Subcategory
44.	methylene chloride	NA	NA	NA	ND	ND	NA	NA	NA	ND
45.	methyl chloride	NA	NA	NA	ND	ND	NA	NA	NA	ND
46.	methyl bromide	NA	NA	NA	ND	ND	NA	NA	NA	ND
47.	bromoform	NA	NA	NA	ND	ND	NA	NA	NA	ND
48.	dichlorobromomethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
49.	trichlorofluoromethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
50.	dichlorodifluoromethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
51.	chlorodibromomethane	NA	NA	NA	ND	ND	NA	NA	NA	ND
52.	hexachlorobutadiene	NA	NA	NA	ND	ND	NA	NA	NA	ND
53.	hexachlorocyclopentadiene	NA	NA	NA	ND	ND	NA	NA	NA	ND
54.	isophorone	NA	NA	NA	ND	ND	NA	NA	NA	ND
55.	naphthalene	NA	NA	NA	ND	ND	NA	NA	NA	ND
56.	nitrobenzene	NA	NA	NA	ND	ND	NA	NA	NA	ND
57.	2-nitrophenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
58.	4-nitrophenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
59.	2,4-dinitrophenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
60.	4,6-dinitro-o-cresol	NA	NA	NA	ND	ND	NA	NA	NA	ND
61.	N-nitrosodimethylamine	NA	NA	NA	ND	ND	NA	NA	NA	ND
62.	N-nitrosodiphenylamine	NA	NA	NA	ND	ND	NA	NA	NA	ND
63.	N-nitrosodi-n-propylamine	NA	NA	NA	ND	ND	NA	NA	NA	ND
64.	pentachlorophenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
65.	phenol	NA	NA	NA	ND	ND	NA	NA	NA	ND
66.	bis(2-ethylhexyl) phthalate	NA	NA	NA	ND	RG	NA	NA	NA	RG
67.	butyl benzyl phthalate	NA	NA	NA	ND	ND	NA	NA	NA	ND
68.	di-n-butyl phthalate	NA	NA	NA	ND	ND	NA	NA	NA	ND
69.	di-n-octyl phthalate	NA	NA	NA	ND	ND	NA	NA	NA	ND
70.	diethyl phthalate	NA	NA	NA	ND	ND	NA	NA	NA	ND
71.	dimethyl phthalate	NA	NA	NA	ND	ND	NA	NA	NA	ND
72.	benzo(a)anthracene	NA	NA	NA	ND	ND	NA	NA	NA	ND
73.	benzo(a)pyrene	NA	NA	NA	ND	ND	NA	NA	NA	ND
74.	3,4-benzofluoranthene	NA	NA	NA	ND	ND	NA	NA	NA	ND
75.	benzo(k)fluoranthene	NA	NA	NA	ND	ND	NA	NA	NA	ND
76.	chrysene	NA	NA	NA	ND	ND	NA	NA	NA	ND
77.	acenaphthylene	NA	NA	NA	ND	ND	NA	NA	NA	ND
78.	anthracene	NA	NA	NA	ND	ND	NA	NA	NA	ND
79.	benzo(ghi)perylene	NA	NA	NA	ND	ND	NA	NA	NA	ND
80.	fluorene	NA	NA	NA	ND	ND	NA	NA	NA	ND
81.	phenanthrene	NA	NA	NA	RG	ND	NA	NA	NA	SU
82.	dibenzo(a,h)anthracene	NA	NA	NA	ND	ND	NA	NA	NA	ND
83.	indeno(1,2,3-c,d)pyrene	NA	NA	NA	ND	ND	NA	NA	NA	ND
84.	pyrene	NA	NA	NA	ND	ND	NA	NA	NA	ND
85.	tetrachloroethylene	NA	NA	NA	ND	ND	NA	NA	NA	ND
86.	toluene	NA	NA	NA	ND	ND	NA	NA	NA	ND

Table VI-9 (Continued)

PRIORITY POLLUTANT DISPOSITION
URANIUM FORMING SUBCATEGORY

Pollutant	Heat Trt. CCW	Surface Trt. Spent Baths	Surface Trt. Rinsewater	Sawing or Grinding Spent Emulsions	Area Cleaning Wastewater	WAPC Blowdown	Drum Wash Water	Laundry Wastewater	Total Subcategory
87. trichloroethylene	NA	NA	NA	ND	ND	NA	NA	NA	ND
88. vinyl chloride	NA	NA	NA	ND	ND	NA	NA	NA	ND
89. aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
90. dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
91. chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA
92. 4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA
93. 4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
94. 4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
95. alpha-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA	NA
96. beta-endosulfan	NA	NA	NA	NA	NA	NA	NA	NA	NA
97. endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA
98. endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
99. endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA
100. heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA
101. heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA
102. alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
103. beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
104. gamma-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
105. delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
106. PCB-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA
107. PCB-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
108. PCB-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA
109. PCB-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA
110. PCB-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA
111. PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
112. PCB-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA
113. toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA
114. antimony	NT	NT	ND	NT	NT	ND	ND	ND	NT
115. arsenic	ND	ND	ND	ND	NT	ND	ND	NT	NT
116. asbestos	NA	NA	NA	NA	NA	NA	NA	NA	NA
117. beryllium	NT	RG	RG	NT	NT	NT	NT	NT	SU
118. cadmium	ND	RG	RG	RG	RG	ND	ND	ND	RG
119. chromium	RG	RG	RG	RG	RG	ND	NT	ND	RG
120. copper	RG	RG	RG	RG	RG	NT	RG	NT	RG
121. cyanide	ND	NA	RG	NT	RG	ND	ND	ND	SU
122. lead	RG	RG	RG	RG	RG	RG	RG	NT	RG
123. mercury	ND	NT	ND	ND	ND	ND	ND	ND	NT
124. nickel	RG	RG	RG	NT	RG	NT	ND	ND	RG
125. selenium	ND	ND	NT	NT	NT	ND	ND	ND	NT
126. silver	NT	NT	ND	NT	NT	NT	ND	NT	NT
127. thallium	NT	NT	ND	NT	ND	NT	ND	ND	NT
128. zinc	NT	RG	RG	RG	RG	RG	RG	RG	RG
129. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table VI-9 (Continued)

PRIORITY POLLUTANT DISPOSITION
URANIUM FORMING SUBCATEGORY

Key:
- NA - Not Analyzed
- ND - Never Detected
- NQ - Never Found Above Their Analytical Quantification
- NT - Detected Below Levels Achievable by Treatment
- SU - Detected in a Small Number of Sources
- RG - Considered for Regulation

Table VI-10

PRIORITY POLLUTANT DISPOSITION
ZINC FORMING SUBCATEGORY

	Pollutant	Surface Trt. Rinsewater	Alkaline Cleaning Rinsewater	Total Subcategory
1.	acenaphthene	ND	NQ	NQ
2.	acrolein	ND	ND	ND
3.	acrylonitrile	NT	NT	NT
4.	benzene	NT	NT	NT
5.	benzidine	ND	ND	ND
6.	carbon tetrachloride	NT	NT	NT
7.	chlorobenzene	NQ	NQ	NQ
8.	1,2,4-trichlorobenzene	ND	ND	ND
9.	hexachlorobenzene	ND	ND	ND
10.	1,2-dichloroethane	NQ	NQ	NQ
11.	1,1,1-trichloroethane	ND	NT	NT
12.	hexachloroethane	ND	ND	ND
13.	1,1-dichloroethane	NT	NT	NT
14.	1,1,2-trichloroethane	NQ	NQ	NQ
15.	1,1,2,2-tetrachloroethane	NT	NT	NT
16.	chloroethane	ND	ND	ND
17.	bis(chloromethyl) ether	ND	ND	ND
18.	bis(2-chloroethyl) ether	NT	NQ	NT
19.	2-chloroethyl vinyl ether	ND	ND	ND
20.	2-chloronaphthalene	ND	ND	ND
21.	2,4,6-trichlorophenol	ND	ND	ND
22.	parachlorometa cresol	ND	ND	ND
23.	chloroform	NT	NT	NT
24.	2-chlorophenol	ND	ND	ND
25.	1,2-dichlorobenzene	ND	ND	ND
26.	1,3-dichlorobenzene	ND	ND	ND
27.	1,4-dichlorobenzene	ND	ND	ND
28.	3,3'-dichlorobenzidine	ND	ND	ND
29.	1,1-dichloroethylene	NT	NT	NT
30.	1,2-trans-dichloroethylene	NT	NT	NT
31.	2,4-dichlorophenol	ND	ND	ND
32.	1,2-dichloropropane	NQ	NT	NT
33.	1,2-dichloropropylene	NQ	NT	NT
34.	2,4-dimethylphenol	NT	ND	NT
35.	2,4-dinitrotoluene	ND	ND	ND
36.	2,6-dinitrotoluene	NT	NT	NT
37.	1,2-diphenylhydrazine	NQ	NQ	NQ
38.	ethylbenzene	NT	NT	NT
39.	fluoranthene	ND	NT	NT
40.	4-chlorophenyl phenyl ether	ND	ND	ND
41.	4-bromophenyl phenyl ether	ND	ND	ND
42.	bis(2-chloroisopropyl) ether	ND	ND	ND
43.	bis(2-chloroethoxy) methane	NT	NT	NT

Table VI-10 (Continued)

PRIORITY POLLUTANT DISPOSITION
ZINC FORMING SUBCATEGORY

	Pollutant	Surface Trt. Rinsewater	Alkaline Cleaning Rinsewater	Total Subcategory
44.	methylene chloride	NT	NT	NT
45.	methyl chloride	ND	ND	ND
46.	methyl bromide	ND	NQ	NQ
47.	bromoform	NT	NT	NT
48.	dichlorobromomethane	NT	NT	NT
49.	trichlorofluoromethane	ND	ND	ND
50.	dichlorodifluoromethane	ND	ND	ND
51.	chlorodibromomethane	RG	NT	RG
52.	hexachlorobutadiene	ND	ND	ND
53.	hexachlorocyclopentadiene	ND	ND	ND
54.	isophorone	ND	ND	ND
55.	naphthalene	NT	NT	NT
56.	nitrobenzene	ND	ND	ND
57.	2-nitrophenol	ND	ND	ND
58.	4-nitrophenol	ND	ND	ND
59.	2,4-dinitrophenol	ND	ND	ND
60.	4,6-dinitro-o-cresol	ND	ND	ND
61.	N-nitrosodimethylamine	ND	ND	ND
62.	N-nitrosodiphenylamine	ND	ND	ND
63.	N-nitrosodi-n-propylamine	ND	ND	ND
64.	pentachlorophenol	ND	ND	ND
65.	phenol	ND	ND	ND
66.	bis(2-ethylhexyl) phthalate	NQ	RG	RG
67.	butyl benzyl phthalate	NT	NT	NT
68.	di-n-butyl phthalate	RG	ND	RG
69.	di-n-octyl phthalate	ND	ND	ND
70.	diethyl phthalate	NT	NT	NT
71.	dimethyl phthalate	ND	ND	ND
72.	benzo(a)anthracene	NT	NT	NT
73.	benzo(a)pyrene	ND	ND	ND
74.	3,4-benzofluoranthene	ND	ND	ND
75.	benzo(k)fluoranthene	ND	ND	ND
76.	chrysene	NT	ND	NT
77.	acenaphthylene	ND	ND	ND
78.	anthracene	NQ	NT	NT
79.	benzo(ghi)perylene	ND	ND	ND
80.	fluorene	ND	ND	ND
81.	phenanthrene	NQ	NT	NT
82.	dibenzo(a,h)anthracene	ND	ND	ND
83.	indeno(1,2,3-c,d)pyrene	ND	TS	TS
84.	pyrene	ND	ND	ND
85.	tetrachloroethylene	NT	NT	NT
86.	toluene	NT	NT	NT

Table VI-10 (Continued)

PRIORITY POLLUTANT DISPOSITION
ZINC FORMING SUBCATEGORY

	Pollutant	Surface Trt. Rinsewater	Alkaline Cleaning Rinsewater	Total Subcategory
87.	trichloroethylene	NT	NT	NT
88.	vinyl chloride	ND	ND	ND
89.	aldrin	NA	NA	NA
90.	dieldrin	NA	NA	NA
91.	chlordane	NA	NA	NA
92.	4,4'-DDT	NA	NA	NA
93.	4,4'-DDE	NA	NA	NA
94.	4,4'-DDD	NA	NA	NA
95.	alpha-endosulfan	NA	NA	NA
96.	beta-endosulfan	NA	NA	NA
97.	endosulfan sulfate	NA	NA	NA
98.	endrin	NA	NA	NA
99.	endrin aldehyde	NA	NA	NA
100.	heptachlor	NA	NA	NA
101.	heptachlor epoxide	NA	NA	NA
102.	alpha-BHC	NA	NA	NA
103.	beta-BHC	NA	NA	NA
104.	gamma-BHC	NA	NA	NA
105.	delta-BHC	NA	NA	NA
106.	PCB-1242	NA	NA	NA
107.	PCB-1254	NA	NA	NA
108.	PCB-1221	NA	NA	NA
109.	PCB-1232	NA	NA	NA
110.	PCB-1248	NA	NA	NA
111.	PCB-1260	NA	NA	NA
112.	PCB-1016	NA	NA	NA
113.	toxaphene	NA	NA	NA
114.	antimony	ND	ND	ND
115.	arsenic	ND	ND	ND
116.	asbestos	NA	NA	NA
117.	beryllium	ND	ND	ND
118.	cadmium	ND	ND	ND
119.	chromium	RG	ND	RG
120.	copper	ND	ND	ND
121.	cyanide	ND	RG	RG
122.	lead	ND	ND	ND
123.	mercury	ND	ND	ND
124.	nickel	RG	ND	RG
125.	selenium	ND	ND	ND
126.	silver	ND	ND	ND
127.	thallium	ND	ND	ND
128.	zinc	RG	RG	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA

Table VI-10 (Continued)

PRIORITY POLLUTANT DISPOSITION
ZINC FORMING SUBCATEGORY

Key: NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

Table VI-11

PRIORITY POLLUTANT DISPOSITION
ZIRCONIUM-HAFNIUM FORMING SUBCATEGORY

Pollutant	Total Subcategory
1. acenaphthene	ND
2. acrolein	NT
3. acrylonitrile	ND
4. benzene	NQ
5. benzidine	ND
6. carbon tetrachloride	ND
7. chlorobenzene	NQ
8. 1,2,4-trichlorobenzene	ND
9. hexachlorobenzene	ND
10. 1,2-dichloroethane	ND
11. 1,1,1-trichloroethane	SU
12. hexachloroethane	ND
13. 1,1-dichloroethane	NQ
14. 1,1,2-trichloroethane	ND
15. 1,1,2,2-tetrachloroethane	ND
16. chloroethane	ND
17. bis(chloromethyl) ether	ND
18. bis(2-chloroethyl) ether	ND
19. 2-chloroethyl vinyl ether	ND
20. 2-chloronaphthalene	ND
21. 2,4,6-trichlorophenol	ND
22. parachlorometa cresol	SU
23. chloroform	NT*
24. 2-chlorophenol	ND
25. 1,2-dichlorobenzene	ND
26. 1,3-dichlorobenzene	ND
27. 1,4-dichlorobenzene	ND
28. 3,3'-dichlorobenzidine	ND
29. 1,1-dichloroethylene	ND
30. 1,2-trans-dichloroethylene	ND
31. 2,4-dichlorophenol	ND
32. 1,2-dichloropropane	ND
33. 1,2-dichloropropylene	ND
34. 2,4-dimethylphenol	ND
35. 2,4-dinitrotoluene	ND
36. 2,6-dinitrotoluene	ND
37. 1,2-diphenylhydrazine	ND
38. ethylbenzene	SU
39. fluoranthene	ND
40. 4-chlorophenyl phenyl ether	ND
41. 4-bromophenyl phenyl ether	ND
42. bis(2-chloroisopropyl) ether	ND
43. bis(2-chloroethoxy) methane	ND

Table VI-11 (Continued)

PRIORITY POLLUTANT DISPOSITION
ZIRCONIUM-HAFNIUM FORMING SUBCATEGORY

Pollutant	Total Subcategory
44. methylene chloride	RG
45. methyl chloride	ND
46. methyl bromide	ND
47. bromoform	ND
48. dichlorobromomethane	ND
49. trichlorofluoromethane	ND
50. dichlorodifluoromethane	ND
51. chlorodibromomethane	ND
52. hexachlorobutadiene	ND
53. hexachlorocyclopentadiene	ND
54. isophorone	ND
55. naphthalene	ND
56. nitrobenzene	ND
57. 2-nitrophenol	NQ
58. 4-nitrophenol	ND
59. 2,4-dinitrophenol	ND
60. 4,6-dinitro-o-cresol	ND
61. N-nitrosodimethylamine	ND
62. N-nitrosodiphenylamine	ND
63. N-nitrosodi-n-propylamine	ND
64. pentachlorophenol	ND
65. phenol	ND
66. bis(2-ethylhexyl) phthalate	SU
67. butyl benzyl phthalate	ND
68. di-n-butyl phthalate	NQ
69. di-n-octyl phthalate	SU
70. diethyl phthalate	NQ
71. dimethyl phthalate	ND
72. benzo(a)anthracene	ND
73. benzo(a)pyrene	ND
74. 3,4-benzofluoranthene	ND
75. benzo(k)fluoranthene	ND
76. chrysene	ND
77. acenaphthylene	ND
78. anthracene	NQ
79. benzo(ghi)perylene	ND
80. fluorene	ND
81. phenanthrene	NQ
82. dibenzo(a,h)anthracene	ND
83. indeno(1,2,3-c,d)pyrene	ND
84. pyrene	ND
85. tetrachloroethylene	NQ
86. toluene	RG

Table VI-11 (Continued)

PRIORITY POLLUTANT DISPOSITION
ZIRCONIUM-HAFNIUM FORMING SUBCATEGORY

Pollutant	Total Subcategory
87. trichloroethylene	NQ
88. vinyl chloride	ND
89. aldrin	ND
90. dieldrin	ND
91. chlordane	ND
92. 4,4'-DDT	ND
93. 4,4'-DDE	ND
94. 4,4'-DDD	ND
95. alpha-endosulfan	ND
96. beta-endosulfan	ND
97. endosulfan sulfate	ND
98. endrin	ND
99. endrin aldehyde	ND
100. heptachlor	ND
101. heptachlor epoxide	ND
102. alpha-BHC	ND
103. beta-BHC	ND
104. gamma-BHC	ND
105. delta-BHC	ND
106. PCB-1242	ND
107. PCB-1254	ND
108. PCB-1221	ND
109. PCB-1232	ND
110. PCB-1248	ND
111. PCB-1260	ND
112. PCB-1016	ND
113. toxaphene	ND
114. antimony	SU
115. arsenic	SU
116. asbestos	NA
117. beryllium	NT
118. cadmium	SU
119. chromium	RG
120. copper	RG
121. cyanide	RG
122. lead	RG
123. mercury	NT*
124. nickel	RG
125. selenium	NT
126. silver	NT
127. thallium	SU
128. zinc	RG
129. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA

Table VI-11 (Continued)

PRIORITY POLLUTANT DISPOSITION
ZIRCONIUM-HAFNIUM FORMING SUBCATEGORY

*These pollutant parameters could also have been eliminated from further consideration due to presence in a small number of sources (SU).

Key: NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

Table VI-12

PRIORITY POLLUTANT DISPOSITION
METAL POWDERS FORMING SUBCATEGORY

	Pollutant	MPP Wet Atomization Wastewater	Tumbling, Burnishing or Cleaning Wastewater	Sawing or Grinding Spent Emulsions	Steam Trt. WAPC	Total Subcategory
1.	acenaphthene	NA	ND	ND	ND	ND
2.	acrolein	NA	ND	ND	ND	ND
3.	acrylonitrile	NA	ND	ND	ND	ND
4.	benzene	NA	NT	ND	NT	NT*
5.	benzidine	NA	ND	ND	ND	ND
6.	carbon tetrachloride	NA	NT	NT	NT	NT
7.	chlorobenzene	NA	ND	ND	ND	ND
8.	1,2,4-trichlorobenzene	NA	ND	ND	ND	ND
9.	hexachlorobenzene	NA	ND	ND	ND	ND
10.	1,2-dichloroethane	NA	ND	ND	ND	ND
11.	1,1,1-trichloroethane	NA	RG	RG	NT	RG
12.	hexachloroethane	NA	ND	ND	ND	ND
13.	1,1-dichloroethane	NA	ND	ND	ND	ND
14.	1,1,2-trichloroethane	NA	ND	ND	ND	ND
15.	1,1,2,2-tetrachloroethane	NA	ND	ND	ND	ND
16.	chloroethane	NA	ND	ND	ND	ND
17.	bis(chloromethyl) ether	NA	ND	ND	ND	ND
18.	bis(2-chloroethyl) ether	NA	ND	ND	ND	ND
19.	2-chloroethyl vinyl ether	NA	ND	ND	ND	ND
20.	2-chloronaphthalene	NA	ND	ND	ND	ND
21.	2,4,6-trichlorophenol	NA	ND	ND	ND	ND
22.	parachlorometa cresol	NA	ND	ND	ND	ND
23.	chloroform	NA	ND	ND	ND	ND
24.	2-chlorophenol	NA	ND	ND	ND	ND
25.	1,2-dichlorobenzene	NA	ND	ND	ND	ND
26.	1,3-dichlorobenzene	NA	ND	ND	ND	ND
27.	1,4-dichlorobenzene	NA	ND	ND	ND	ND
28.	3,3'-dichlorobenzidine	NA	ND	ND	ND	ND
29.	1,1-dichloroethylene	NA	ND	ND	ND	ND
30.	1,2-trans-dichloroethylene	NA	ND	ND	ND	ND
31.	2,4-dichlorophenol	NA	ND	ND	ND	ND
32.	1,2-dichloropropane	NA	ND	ND	ND	ND
33.	1,2-dichloropropylene	NA	ND	ND	ND	ND
34.	2,4-dimethylphenol	NA	ND	ND	ND	ND
35.	2,4-dinitrotoluene	NA	ND	ND	ND	ND
36.	2,6-dinitrotoluene	NA	ND	ND	ND	ND
37.	1,2-diphenylhydrazine	NA	ND	ND	ND	ND
38.	ethylbenzene	NA	ND	ND	ND	ND
39.	fluoranthene	NA	ND	ND	ND	ND
40.	4-chlorophenyl phenyl ether	NA	ND	ND	ND	ND
41.	4-bromophenyl phenyl ether	NA	ND	ND	ND	ND
42.	bis(2-chloroisopropyl) ether	NA	ND	ND	ND	ND
43.	bis(2-chloroethoxy) methane	NA	ND	ND	ND	ND

Table VI-12 (Continued)

PRIORITY POLLUTANT DISPOSITION
METAL POWDERS FORMING SUBCATEGORY

	Pollutant	MPP Wet Atomization Wastewater	Tumbling, Burnishing or Cleaning Wastewater	Sawing or Grinding Spent Emulsions	Steam Trt. WAPC	Total Subcategory
44.	methylene chloride	NA	NT*	ND	NT	NT*
45.	methyl chloride	NA	ND	ND	ND	ND
46.	methyl bromide	NA	ND	ND	ND	ND
47.	bromoform	NA	ND	ND	ND	ND
48.	dichlorobromomethane	NA	ND	ND	ND	ND
49.	trichlorofluoromethane	NA	ND	ND	ND	ND
50.	dichlorodifluoromethane	NA	ND	ND	ND	ND
51.	chlorodibromomethane	NA	ND	ND	ND	ND
52.	hexachlorobutadiene	NA	ND	ND	ND	ND
53.	hexachlorocyclopentadiene	NA	ND	ND	ND	ND
54.	isophorone	NA	ND	ND	ND	ND
55.	naphthalene	NA	ND	ND	ND	ND
56.	nitrobenzene	NA	ND	ND	ND	ND
57.	2-nitrophenol	NA	ND	ND	ND	ND
58.	4-nitrophenol	NA	ND	ND	ND	ND
59.	2,4-dinitrophenol	NA	ND	ND	ND	ND
60.	4,6-dinitro-o-cresol	NA	ND	ND	ND	ND
61.	N-nitrosodimethylamine	NA	ND	ND	ND	ND
62.	N-nitrosodiphenylamine	NA	ND	ND	ND	ND
63.	N-nitrosodi-n-propylamine	NA	ND	ND	ND	ND
64.	pentachlorophenol	NA	ND	ND	ND	ND
65.	phenol	NA	ND	ND	ND	ND
66.	bis(2-ethylhexyl) phthalate	NA	ND	ND	ND	ND
67.	butyl benzyl phthalate	NA	ND	ND	ND	ND
68.	di-n-butyl phthalate	NA	ND	ND	ND	ND
69.	di-n-octyl phthalate	NA	ND	ND	ND	ND
70.	diethyl phthalate	NA	ND	ND	ND	ND
71.	dimethyl phthalate	NA	ND	ND	ND	ND
72.	benzo(a)anthracene	NA	ND	ND	ND	ND
73.	benzo(a)pyrene	NA	ND	ND	ND	ND
74.	3,4-benzofluoranthene	NA	ND	ND	ND	ND
75.	benzo(k)fluoranthene	NA	ND	ND	ND	ND
76.	chrysene	NA	ND	ND	ND	ND
77.	acenaphthylene	NA	ND	ND	ND	ND
78.	anthracene	NA	ND	ND	ND	ND
79.	benzo(ghi)perylene	NA	ND	ND	ND	ND
80.	fluorene	NA	ND	ND	ND	ND
81.	phenanthrene	NA	ND	ND	ND	ND
82.	dibenzo(a,h)anthracene	NA	ND	ND	ND	ND
83.	indeno(1,2,3-c,d)pyrene	NA	ND	ND	ND	ND
84.	pyrene	NA	ND	ND	ND	ND
85.	tetrachloroethylene	NA	ND	ND	ND	ND
86.	toluene	NA	NT*	NT	NT	NT*

Table VI-12 (Continued)

PRIORITY POLLUTANT DISPOSITION
METAL POWDERS FORMING SUBCATEGORY

	Pollutant	MPP Wet Atomization Wastewater	Tumbling, Burnishing or Cleaning Wastewater	Sawing or Grinding Spent Emulsions	Steam Trt. WAPC	Total Subcategory
87.	trichloroethylene	NA	ND	ND	ND	ND
88.	vinyl chloride	NA	ND	ND	ND	ND
89.	aldrin	NA	NA	NA	NA	NA
90.	dieldrin	NA	NA	NA	NA	NA
91.	chlordane	NA	NA	NA	NA	NA
92.	4,4'-DDT	NA	NA	NA	NA	NA
93.	4,4'-DDE	NA	NA	NA	NA	NA
94.	4,4'-DDD	NA	NA	NA	NA	NA
95.	alpha-endosulfan	NA	NA	NA	NA	NA
96.	beta-endosulfan	NA	NA	NA	NA	NA
97.	endosulfan sulfate	NA	NA	NA	NA	NA
98.	endrin	NA	NA	NA	NA	NA
99.	endrin aldehyde	NA	NA	NA	NA	NA
100.	heptachlor	NA	NA	NA	NA	NA
101.	heptachlor epoxide	NA	NA	NA	NA	NA
102.	alpha-BHC	NA	NA	NA	NA	NA
103.	beta-BHC	NA	NA	NA	NA	NA
104.	gamma-BHC	NA	NA	NA	NA	NA
105.	delta-BHC	NA	NA	NA	NA	NA
106.	PCB-1242	NA	NA	NA	NA	NA
107.	PCB-1254	NA	NA	NA	NA	NA
108.	PCB-1221	NA	NA	NA	NA	NA
109.	PCB-1232	NA	NA	NA	NA	NA
110.	PCB-1248	NA	NA	NA	NA	NA
111.	PCB-1260	NA	NA	NA	NA	NA
112.	PCB-1016	NA	NA	NA	NA	NA
113.	toxaphene	NA	NA	NA	NA	NA
114.	antimony	NA	NT*	ND	ND	NT*
115.	arsenic	ND	NT*	ND	ND	NT*
116.	asbestos	NA	NA	NA	NA	NA
117.	beryllium	NA	ND	ND	ND	ND
118.	cadmium	ND	ND	ND	ND	ND
119.	chromium	RG	RG	RG	ND	RG
120.	copper	RG	RG	RG	ND	RG
121.	cyanide	NT	RG	RG	RG	RG
122.	lead	SU	RG	RG	ND	RG
123.	mercury	ND	ND	ND	ND	ND
124.	nickel	RG	RG	NT	ND	RG
125.	selenium	NA	ND	ND	ND	ND
126.	silver	NA	ND	ND	ND	ND
127.	thallium	NA	ND	NT	ND	NT
128.	zinc	RG	RG	RG	NT	RG
129.	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	NA	NA	NA	NA	NA

Table VI-12 (Continued)

PRIORITY POLLUTANT DISPOSITION
METAL POWDERS FORMING SUBCATEGORY

*These pollutant parameters could also have been eliminated from further consideration due to presence in a small number of sources (SU).

Key: NA - Not Analyzed
ND - Never Detected
NQ - Never Found Above Their Analytical Quantification
NT - Detected Below Levels Achievable by Treatment
SU - Detected in a Small Number of Sources
RG - Considered for Regulation

* U.S. GOVERNMENT PRINTING OFFICE 1986; 621-735/60542