UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

November 30, 2008

In Reply Refer To: WTR-7

Pete Vaghishia, Owner
Graphic Research
9334 Mason Avenue
Chatsworth, California 91311

Re: September 9, 2008 Clean Water Act Inspection

Dear Mr. Vaghishia:

Enclosed is the November 30 report for our September 9, 2008 inspection of Graphic Research. Please submit a short response to the findings in Sections 2 through 5, to EPA, the City of Los Angeles, and the Regional Water Quality Control Board, by **January 28, 2009**.

The main findings are summarized below:

1 Graphic Research qualifies as a new source metal finisher under 40 CFR 433.

2 On-site treatment is substantially equivalent to the models used in setting the Federal standards, but consistent compliance has not quite been reached, likely because solids removal is overall less efficient than clarification. Operational controls which improve performance are employed, most notably segregated treatment by strength and composition, hard-piped delivery, up-to-date process controls, and lined floors and pipe trenches.

3 The monthly self-monitoring is representative over the sampling day and reporting period. However, the Federal cyanide standards should be applied to only the cyanide-bearing rinses, and the pH of the overall discharge should be continuously monitored.

I appreciate your helpfulness extended to me during this inspection. I remain available to the City of Los Angeles, and to you to assist in any way. Please do not hesitate to call me at (415) 972-3504 or e-mail at arthur.greg@epa.gov.

Sincerely,

Greg V. Arthur
CWA Compliance Office

Enclosure

cc: Bellete Yohannes, Senior Inspector, City of Los Angeles
David Hung, RWQCB-Los Angeles

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

CLEAN WATER ACT COMPLIANCE OFFICE

NPDES COMPLIANCE EVALUATION INSPECTION REPORT

Industrial User:	Graphic Research 9334 Mason Avenue, Chatsworth, California 91311 New Source Metal Finishing (40 CFR 433)
Treatment Works:	City of Los Angeles Hyperion Wastewater Treatment Plant NPDES Permit CA0109991 - California WDRs R4-2005-0020)
Pretreatment Program:	City of Los Angeles, Bureau of Sanitation
Date of Inspection:	September 9, 2008

Inspection Participants:

US EPA:	Greg V. Arthur, Region 9, CWA Compliance Office, (415) 972-3504 Howard Kahan, Region 9, Los Angeles Office
RWQCB-Los Angeles:	None
City of Los Angeles:	Bellete Yohannes, Senior Inspector, (323) 342-6046 Mike Lee, Inspector, (323) 342-6187 Vinnie Kalra, Senior Inspector
Graphic Research:	Pete Vaghishia, Owner, (818) 886-7340 Fred Greear, Facilities Manager, (818) 886-7340

Report Prepared By:	Greg V. Arthur, Environmental Engineer November 30, 2008

1.0 Scope and Purpose

On September 9, 2008, EPA and the City of Los Angeles conducted a compliance evaluation inspection of Graphic Research in Chatsworth, California. The purpose was to ensure compliance with the Federal regulations covering the discharge of non-domestic wastewaters into the sewers. In particular, it was to ensure:

- Classification in the proper Federal categories;
- Application of the correct standards at the correct sampling points;
- Consistent compliance with the standards; and
- Fulfillment of Federal self-monitoring requirements.

Graphic Research is a significant industrial user ("SIU") within sewer service areas administered by the City of Los Angeles whose compliance was assessed as part of an on-going EPA evaluation of industrial users in EPA Region 9 by sector. The inspection participants are listed on the title page. Arthur conducted the inspection.

1.1 Process Description

Graphic Research is job-shop full service printed circuit board manufacturer of multilayer boards. Graphic Research does both prototype and production work, of both flexible and non-flexible boards, on various substrates. Graphic Research began operations in 1969 but has retooled and reconfigured with new operations in 1990.

- Board Scrubbing – abrasive scrubbing, acid etch ($HNO_3/H_2SO_4/H_3PO_4$).
- Photo Resist – dry film applied, caustic developer (Na_2CO_3), photo resist strip (NaOH).
- Etching – cupric etching ($HCl/CuCl_2$), ammonia etching (NH_4Cl/NH_3).
- Inner Layer Bonding – alkaline clean strip (NaOH), acid pre-dip (H_2SO_4), black oxide roughening (H_2SO_4/H_2O_2), hand cleaning, pressure lamination.
- Hole Drilling – CNC drilling, vacuum blasting (Al_2O_3 powder), vapor cleaning (CF_4/O_2).
- Hole Plating – microetch (HCl), glass etch (HF), acid deactivation, acid activation (H_2SO_4), tin/palladium catalyst, electroless copper plate (EDTA/formaldehyde), rack strip (H_2SO_4/S_2O_8).
- Plating – alkaline clean (NaOH), microetch (HCl), acid activation (H_2SO_4), acid-copper plating ($CuSO_4$), tin/lead plating (HBF_4), nickel plating (SO_4^{-2}), acid gold plating (citric acid).
- Soldering – solder preparation (HCl), solder reflow, hot air leveling, solder strip (HNO_3).
- Finishing – cut to final product, final water cleaning.

See Appendix 1 on page 16 for a schematic of the configuration and layout of wastewater handling. Also see Table 1 in Appendix 2 on page 17 for a process tank inventory. Photo documentation of this inspection follows in Section 1.7 on page 5.

1.2 Facility SIC Code

Graphic Research is assigned the SIC code for printed circuit boards (SIC 3472).

1.3 Facility Wastewater Sources

The printed circuit board manufacturing lines generate spents, rinses, wash waters, spills, and residuals. All wastewaters are all hard-piped by water quality and strength into separate collection systems and industrial wastewater treatment ("IWT") units, designated as A through G, and CC, for segregated treatment. The pipes are labeled by letter for visual identification according to the designated end treatment. ***See*** Tables 2, 3, and 4 in Appendix 2 on page 18 for lists of generated spents, rinses, wash waters, and residuals, and the methods of their on-site handling. Also ***see*** Photo #1 in Section 1.7 on page 5 of this report.

- IWT Unit A – Unchelated Metal Bearing Wastewaters
- IWT Unit B – Chelated Metal Bearing Wastewaters
- IWT Unit C – Tin/Lead-Related Wastewaters
- IWT Unit CC – Concentrated Copper Bearing Wastewaters
- IWT Unit D – Low-Strength Wastewaters for Discharge
- IWT Unit E – High-Quality Wastewaters for Reuse
- IWT Unit F – High-Strength Wastewaters for Batch Treatment
- IWT Unit G – Strippant-Related Alkaline Wastewaters

Spent Solutions – The imparted contamination from the processing of printed circuit boards and the progressive drop in solution strength results in the generation of spents. The generation rates depend on bath usage, effectiveness of bath contamination control, and the amount of drag-out lost into the rinses or to the floor. The copper, tin/lead, gold, and nickel plating solutions are regenerated strictly through additions and thus do not generate spents. The only losses from these "adds-only" solution tanks therefore would be through the drag-out of solutions into the rinses or onto the floor. Otherwise, these solution tanks without outlets would foul through contamination or fail through use. The spent etchants and solder strippants are hauled off-site. The other spent solutions are handled on-site for discharge to the sewers.

Rinses – Graphic Research primarily employs first-stage on-demand overflow rinsing but also follows some processing steps with drag-out static rinses, first-stage spray rinses, or further rinsing stages. The higher quality rinses have been successfully segregated around metals treatment into the final discharge through the final pH adjustment and clarifiers (Unit-D) or into on-site wastewater reuse (Unit-E). The higher quality rinses follow alkaline and acid preparation steps or are generated wash downs. Drag-outs following the etching and black oxide steps are returned to the solution tanks as make-up. The remaining rinses undergo various forms of treatment prior to discharge through the final clarifiers.

Residuals – Graphic Research generates photo resist solids, spent aluminum oxide vacuum blasting slurry, spent filter cartridges, and industrial wastewater treatment sludges for off-site disposal as hazardous.

1.4 Facility Process Wastewater Handling

Discharge - Graphic Research discharges non-domestic wastewaters to the City of Los Angeles domestic sewers through a single connection designated in this report by permit

number as IWD-495146. Domestic sewage discharges through separate connections downstream of the industrial connection. The April 1, 2008 City of Los Angeles permit identifies the final discharge point as the secured sampling facility after the last stage of the underground clarifier. The permit lists the average discharge to the sewers to be 17,362 gallons per day ("gpd"). ***See*** Appendix 1 on page 16 for a schematic of the configuration and lay-out of the wastewater handling. ***See*** Photo #2 in Section 1.7 of this report on page 5.

Composition - The process-related wastewaters listed in section 1.3 above would be expected to contain copper, lead, nickel, zinc, acidity, as well as chelating agents, solvents, surfactants, other pollutants cleaned off of parts, and the minerals entrained in the water supply.

Delivery - The rinses and spents discharge by gravity through hard-piping installed in floor trenches into a gallery of inlet sumps that feed into the various IWT units. ***See*** Photo #3 in Section 1.7 of this report on page 5. ***Also*** see Section 3.2 of this report on page 10.

Treatment – Graphic Research provides segregated treatment for low-strength rinses and washdowns and high-strength spents of various chemical compositions for discharge to the sewers through final pH adjustment and a below ground clarifier. IWT Units A through G and CC provide for the removal of metals, organics, and solids through ion exchange, chemical precipitation, electrowinning, flocculation, settling, carbon adsorption, cartridge filtering, batch chemical treatment of high-strength spents, and filter pressing of sludges. A number of low-strength rinses determined to have low pollutant levels bypass around the metals removal steps for discharge through the final pH adjustment and below ground clarifier to the sewers. ***See*** Appendix 1 on page 16 of this report. ***Also*** see Section 3.2 of this report on page 10 and Photos #4, #5, and #6 in Section 1.7 of this report on page 5.

Reuse and Reclaim – Some higher quality rinses and some ion exchange effluent streams are segregated into a wastewater reuse system (ITW Unit E) for on-site reuse as process water make-up. In addition, the ion exchange regenerant acids (IWT Unit A and IWT Unit C) are reused for ion exchange regeneration after metals removal through electrowinning.

1.5 Sampling Record

Graphic Research self-monitors monthly as required by the City of Los Angeles permit. The City of Los Angeles also collects its own samples quarterly.

1.6 POTW Legal Authorities

City of Los Angeles - The Bureau of Sanitation administers the pretreatment program in the City areas serviced by the regional Hyperion system. The Hyperion wastewater treatment plant operates under the requirements of the State of California, Los Angeles RWQCB's Waste Discharge Requirements, No. R4-2005-0020, issued in 2005. The WDRs, which also function as NPDES permit No. CA0109991, require the implementation of an approved pretreatment program throughout the sewer service area. Under this authority, the City issued permit No.W-495146 authorizing discharge of non-domestic wastewater to the sewers.

1.7 Photo Documentation

Six of the 12 photographs taken during this inspection are depicted below and saved as *graphic-01.jpg through -12.jpg.*

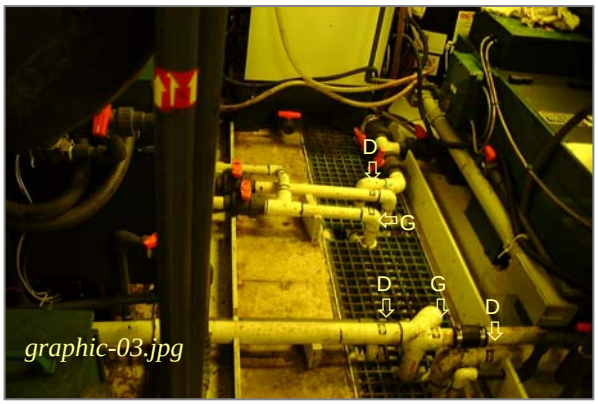


Photo #1: Labeled Wastewater Collection Lines
Taken By: Greg V. Arthur
Date: 09/09/08

Photo #2: IWD-495146, Final Discharge Point
Taken By: Greg V. Arthur
Date: 09/09/08

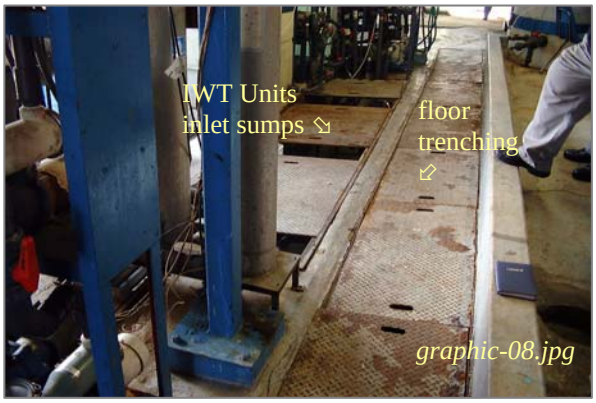


Photo #3: Delivery and Inlet Sump Gallery
Taken By: Greg V. Arthur
Date: 09/09/08

Photo #4: Industrial Wastewater Treatment Units
Taken By: Greg V. Arthur
Date: 09/09/08

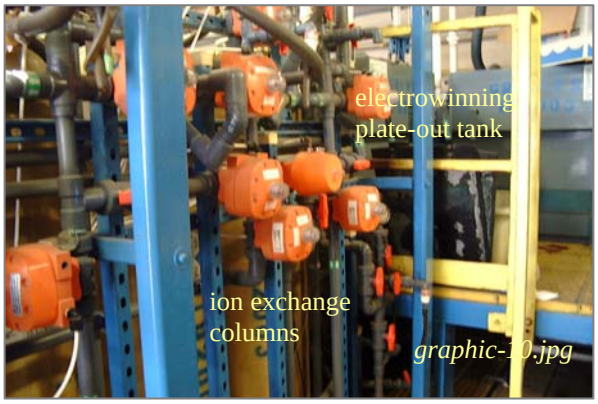


Photo #5: IWT Unit C - Ion Exchange / Plate-Out
Taken By: Greg V. Arthur
Date: 09/09/08

Photo #6: IWT Unit B - Holding and Plate-Out
Taken By: Greg V. Arthur
Date: 09/09/08

2.0 Sewer Discharge Standards and Limits

Federal categorical pretreatment standards (where they exist), national prohibitions, State groundwater, and the local limits (where they exist) must be applied to the sewered discharges from industrial users. (40 CFR 403.5 and 403.6).

Summary

The Federal standards in 40 CFR 433 for new source printed circuit board manufactures apply to all process wastewater discharges from Graphic Research through IWD-495146. Retooling and reconfiguring with new operations in 1990 qualified Graphic Research as a new source. The City of Los Angeles permit correctly advances standards reflecting the application of Federal standards for new sources as adjusted to account for non-contact dilution waters. The permit correctly advances local limits. The application of Federal standards, national prohibitions, and local limits was determined through visual inspection. ***See*** Table 5 in Appendix 2 on page 19 of this report for the permit limits.

Requirements

- None.

Recommendations

- The Federal total cyanide standards should be applied without adjustment to only the cyanide-bearing rinses prior to their commingling with any other wastewaters.

2.1 Classification by Federal Point Source Category

Graphic Research qualifies as a printed circuit board manufacturer subject to the Federal metal finishing standards for new sources in 40 CFR 433.

New or Existing Sources – Graphic Research is now subject to Federal standards for new sources. Under the definitions in 40 CFR 403.3(k), a process constructed at an existing source job-shop metal finisher after August 31, 1982 is a new source (1) if it entirely replaces a process which caused a discharge from an existing source or (2) if it is substantially independent of the existing sources on-site. This means that after the 1982 deadline, the new source standards apply to the original installation of metal finishing lines, rebuilt or moved lines, or existing lines converted to do new operations. In particular, the new source standards would apply when the installation of secondary containment involved the physical relocation and re-installation of entire lines. New source standards generally do not apply to the piecemeal replacement of tanks for maintenance in otherwise intact metal finishing lines, nor do they apply to the upgrading of treatment without altering production lines. The preamble to the final 1988 Federal rule states that the new source standards apply when "an existing source undertakes major construction that legitimately provides it with the

opportunity to install the best and most efficient production process and wastewater treatment technologies" (*Fed Register, Vol.53, No.200, October 17, 1988, p.40601*).

The City of Los Angeles determined that Graphic Research qualifies as a new source because of the addition of new processing lines, and the retooling and reconfiguration of existing processing lines in 1990.

2.2 Local Limits and National Prohibitions

Local limits and the national prohibitions are meant to express the limitations on non-domestic discharges necessary to protect the sewers, treatment plants and their receiving waters from adverse impacts. In particular, they prohibit discharges that can cause the pass-through of pollutants into the receiving waters or into reuse, the operational interference of the sewage treatment works, the contamination of the sewage sludge, sewer worker health and safety risks, fire or explosive risks, and corrosive damage to the sewers. The national prohibitions apply nationwide to all non-domestic sewer discharges. The City of Los Angeles local limits apply to non-domestic discharges in the Hyperion service area.

2.3 Federal Categorical Pretreatment Standards
New Source Metal Finishing - 40 CFR 433.17

40 CFR 433.17	Cd	Cr	Cu	Pb	Ni	Ag	Zn	CNt	Can	TTO
daily-maximum (mg/l)	0.11	2.77	3.38	0.69	3.98	0.43	2.61	1.20	0.86	2.13
month-average (mg/l)	0.07	1.71	2.07	0.43	2.38	0.24	1.48	0.65	0.32	-

Applicability - Under 40 CFR 433.10(a), the metal finishing standards apply to the process wastewaters from Graphic Research because the facility's operations involve printed circuit board manufacturing. The metal finishing standards "... apply to plants that perform ..." the core operations of electroplating, electroless plating, etching, anodizing, chemical coating, or printed circuit board manufacturing and they extend to other on-site operations associated with metal finishing and specifically listed in 40 CFR 433.10(a). If any of the core operations are performed, the new source metal finishing standards apply to discharges from any of the core or associated operations. As a result, the metal finishing standards apply to all process wastewater discharges from Graphic Research to IWD-495146.

Basis of the Standards - The new source metal finishing standards were based on a model pretreatment unit that comprises metals precipitation, settling, sludge removal, source control of toxic organics, no discharge of cadmium-bearing wastewaters, and if necessary, cyanide destruction and chromium reduction. The best-available-technology standards were set where metal finishers with model treatment operated at a long-term average and variability that achieved a compliance rate of 99% (1 in 100 chance of violation).

Adjustments – First, under 40 CFR 433.12(c), the cyanide standards as applied to metal finishing wastewater discharges must be adjusted to account for dilution from non-cyanide bearing waste streams (Federally-regulated and unregulated). For Graphic Research, an

estimated total of only 10 gallons per month of cyanide-bearing wastewater is generated from the rinses following the gold plating steps. As a result, the cyanide standards as applied to the final discharges through IWD-495146 must be adjusted proportionally downward to account for dilution from the non-cyanide bearing waste streams. However, the dilution at IWD-495146 is at least 50,000:1 based on the estimated flow averages, which results in adjusted cyanide standards far below the analytical detection limits for cyanide. As a result, the City of Los Angeles by permit established the daily-maximum and monthly-average standards of 0.07 mg/l as a threshold indicator value of the presence of cyanide. It would be more in keeping with the intent of the Federal standards to apply the total cyanide standards without adjustment to the cyanide-bearing gold plating rinses (T33, T191, T192) before they commingle with any other flows.

Second, under 40 CFR 403.6(d,e), the Federal categorical pretreatment standards at IWD-495146 must be adjusted to account for dilution from non-contact cooling waters, cooling tower bleed, and boiler blowdown. These three flows are specifically listed as dilution waters in 40 CFR 403.6(e), and they account for roughly 110 gpd of the calculated 17,362 gpd total average discharge from Graphic Research. As a result, the combined wastestream formula must be used to adjust the standards downward.

$$C_{495146} = \frac{C_{433}\, Q_{433}}{Q_{433}} \left[\frac{Q_{total} - Q_{dilution}}{Q_{total}} \right]$$

C_{495146} = Fed Standards at IWD-495146
C_{433} = Fed Standards from 40CFR 433
Q_{total} = Flow at IWD-495146
Q_{433} = Flow Regulated by 40CFR 433
$Q_{dilution}$ = Flow Classified as Dilution

Third, the Federal standards in 40 CFR 433.12 also allow facilities with an approved toxic organics management plan to certify instead of sample for toxic organics. The City of Los Angeles approved the toxic organics management plan for Graphic Research in 2002 thereby exempting the facility from toxic organics self-monitoring.

Compliance Deadline - New sources were required to comply on the first day of discharge.

2.4 Federal Prohibitions

The Federal standards in 40 CFR 403.6(d) and 403.17(d) prohibit dilution as a substitute for treatment, and the bypassing of any on-site treatment necessary to comply with standards, respectively. The City of Los Angeles permit establishes these prohibitions through incorporation of provisions against the dilution as a substitute for treatment (Permit Part 6.B.8) and bypassing treatment necessary to comply (Permit Part 6.C.4).

2.5 Point(s) of Compliance

The permit designates the final underground clarifier outside the facility as the location of the secured sampling point (designated in this report as IWD-495146). A new sample point needs to be established for cyanide.

Federal Standards - Federal categorical pretreatment standards apply end-of-process-after-treatment to all Federally-regulated discharges to the sewers. The sample point IWD-495146 is a suitable end-of-process-after-treatment sample point representative of the day-to-day discharge of Federally-regulated wastewaters from Graphic Research for all parameters except cyanide.

Local Limits - Local limits and the national prohibitions apply end-of-pipe to non-domestic flows. The sample point designated as IWD-495146 is a suitable end-of-pipe sample point representative of the day-to-day non-domestic wastewater discharges from Graphic Research.

2.5 Compliance Sampling

The national prohibitions are instantaneous-maximums and are comparable to samples of any length including single grab samples. Federal categorical pretreatment standards are daily-maximums comparable to 24-hour composite samples. The 24-hour composite samples can be replaced with single grabs or manually-composited grabs that are representative of the sampling day's discharge. The City of Los Angeles permit establishes these sampling protocols by specifying the type of sampling required by parameter (Permit Part 3.A.1). ***See*** Section 4.0 of this report on page 13 and Table 5 of Appendix 2 on page 19.

3.0 Compliance with Federal Categorical Standards

Industrial users must comply with the Federal categorical pretreatment standards that apply to their process wastewater discharges. 40 CFR 403.6(b).

Categorical industrial users must comply with the prohibition against dilution of the Federally-regulated waste streams as a substitute for treatment. 40 CFR 403.6(d).

Industrial users must comply with the provision restricting the bypass of treatment necessary to comply with any pretreatment standard or requirement. 40 CFR 403.17(d).

Graphic Research employs wastewater treatment substantially equivalent to the models used in originally setting the Federal standards. Graphic Research has also instituted a number of excellent built-in controls that improve reliability and performance, most notably the hard-piping of all waste streams to treatment, segregated treatment by strength and chemistry, visible pipeline labeling, and the wide spread use of spray rinsing. However, Graphic Research has not quite consistently complied with the Federal standards, most likely because of less than efficient removals of solids and precipitates. ***See*** Table 6 in Appendix 2 on page 20 of this report for a summary of the compliance sampling.

Requirements

- Graphic Research must determine the cause or causes of inconsistent treatment performance in order to achieve consistent compliance with the Federal standards for copper.

Recommendations

- The effluent from IWT Units CC, E, and G, and possibly the entire discharge through IWD-495146 should undergo chemical-aided settling through a Lamella-type clarifier.

- Treated wastewater from the batch treatment unit should be released for delivery to IWT Unit D only after testing verifies compliance.

3.1 Sampling Results

The two year 2006-2008 sample record for Graphic Research collected from the final below ground clarifier consists of monthly self-monitoring and quarterly sampling collected by the City of Los Angeles. All metals samples were 24-hour composites. The others were grabs. ***See*** items 3.2 and 5.0 on pages 10 and 15 of this report.

3.2 Best-Available-Technology Treatment

Graphic Research is currently designed and operated with what is substantially equivalent to best-available-technology ("BAT") model treatment. However, the sampling results do not

quite consistently comply with all of its Federal standards. The samples for copper are not indicative of consistent compliance, with average and calculated 99th% peak concentrations of 1.35 and 4.75 mg/l copper. The samples for the other Federally-regulated pollutants easily met all Federal standards at IWD-495146, with average and calculated 99th% peak concentrations of 0.005 and 0.019 mg/l cadmium, 0.004 and 0.007 mg/l chromium, 0.141 and 0.387 mg/l lead, 0.061 and 0.263 mg/l nickel, 0.012 and 0.039 mg/l silver, 0.155 and 0.833 mg/l zinc, <0.020 mg/l total cyanide, and <0.046 mg/l total toxic organics.

These sampling results indicate that the statistical probability of violating the Federal standards falls between 5% for any sampling day and 25% for any monthly-average. Violation rates like these that are higher than the 1% used in setting the Federal standards point to deficiencies in either the design or the operation of the model treatment. Graphic Research does possess treatment substantially equivalent in design to the model treatment largely involving ion exchange and there are numerous aspects of improved operational controls which would be expected to significantly improve performance. However, there are also a few notable deficiencies in the design and operation observed during this inspection. The improvements (+) and deficiencies (-) are listed below.

+ Hard-piped delivery from the sources to the wastewater treatment units.
+ Clear labeling on all wastewater delivery piping.
+ Separate wastewater delivery systems segregated by strength and chemical composition.
+ Separate wastewater treatment units segregated by strength and treatability.
+ Alkaline borohydride batch treatment of high-strength wastewaters.
+ Excellent secondary containment in PVC lined floors and pipe gallery trenches.
+ Excellent process controls, reaction end-point monitoring, and telemetering to SCADA.
- Solids removal by filter press or cartridge filtering is less efficient than clarification.
- Final clarification is not as efficient as chemical-aided Lamella-type clarification.
- No testing after batch treatment for compliance prior to release and delivery.

The sampling results reflect and are the result of the inconsistent performance of the existing treatment at Graphic Research. The causes of this inconsistency appear to be related to the lessened efficiency of the solids removal steps involved in the batch treatment of spents and spills in IWT Unit F, and in the filtering of concentrated copper flows in IWT Unit CC. In addition, IWT Unit D is undersized in two ways. First, the final clarifier is not designed as well as the deep plate coalescing clarifiers usually employed in the removal of flocculated precipitate solids from industrial wastewaters. Second, the 200-gallon inlet sump is too small to provide surge equalization for the nearly 30,000 gpd of wastewater fed through IWT Unit D to the sewers. Inconsistent performance may also be related to the misidentification of copper-bearing wastewaters around the pretreatment steps to IWT Unit D. In this inspection, EPA is able to identify the existence of, but cannot specify with certainty, the causes of inconsistent performance.

3.3 Dilution as a Substitute for Treatment

The Federal standards in 40 CFR 403.6(d) prohibit "dilution as a substitute for treatment" in order to prevent compromising BAT model treatment with dilute waste streams. In particu-

lar, this prohibition applies when sample results for a diluted waste stream are below the Federal standards and the apparent compliance is used to justify discharge without treatment. There are two conditions that need to be established in order to make a determination of non-compliance with this prohibition. First, some or all of the Federally-regulated wastewaters must discharge without undergoing BAT model treatment or its equivalent. Second, there must be some form of excess water usage within a Federally-regulated process.

There is no evidence of dilution as a substitute for treatment since Graphic Research does not meet both conditions of non-compliance. The first condition is met since not all Federally-regulated waters discharge through BAT model treatment. However, the second condition is not met since the rinses were observed to be either on-demand or static.

3.4 Bypass Provision

The Federal standards in 40 CFR 403.17 prohibit the bypassing of any on-site treatment necessary to comply with standards unless the bypass was unavoidable to prevent the loss of life, injury, or property damage, and there were no feasible alternatives. This provision explicitly prohibits bypasses that are the result of a short-sighted lack of back-up equipment for normal downtimes or preventive maintenance. It also explicitly prohibits bypasses that could be prevented through wastewater retention or the procurement of auxiliary equipment. It specifically allows bypasses that do not result in violations of the standards as long as there is prior notice and approval from the sewerage agency or State.

Compliance with this provision cannot be determined at this time since it is possible that the violations of Federal standards could have been caused by the direction of wastewaters around the pretreatment steps to IWT Unit D for less than BAT treatment. On the other hand, Graphic Research has incorporated robust methods of ensuring the hard-piped delivery of all spents and rinses directly to the treatment units. As a result, there is no need for portable pumping and hosing, and thus there is a significant reduction in the potential for an inadvertent bypass of treatment.

4.0 Compliance with Local Limits and National Prohibitions

All non-domestic wastewater discharges to the sewers must comply with local limits and the national prohibitions. 40 CFR 403.5(a,b,d).

Industrial users must comply with the provision restricting the bypass of treatment necessary to comply with any pretreatment standard or requirement. 40 CFR 403.17(d).

The sample record indicates that Graphic Research, even with the inconsistent performance of the on-site treatment, complies with all of its local limits for metals, cyanide, organics, and sulfides, and would be expected to comply with the national prohibitions for flammability. However, the self-monitoring results also indicated the occasional pass-through of acidic wastewaters in violation of both the local limits and national prohibitions for pH. ***See*** Table 6 of Appendix 2 on page 20 of this report. ***Also*** see Sections 3.0 and 5.0 on pages 10 and 15 of this report.

Requirements

- The causes of any untreated or partially treated acidic discharges to the sewers must be identified.

Recommendations

- The final discharge should be continuously self-monitored for pH.
- An automatic shunt after IWT Unit D should be installed to divert off-spec acidic wastewaters to holding for retreatment for pH.
- Influent equalization should be increased into IWT Unit D in order to ensure the consistent wastewater feed through the final treatment steps.

4.1 National Objectives

The general pretreatment regulations were promulgated in order to fulfill the national objectives to prevent the introduction of pollutants that:

(1) cause operational interference with sewage treatment or sludge disposal,
(2) pass-through sewage treatment into the receiving waters or sludge,
(3) are in any way incompatible with the sewerage works, or
(4) do not improve the opportunities to recycle municipal wastewaters and sludge.

This inspection did not include an evaluation of whether achievement of the national objectives in 40 CFR 403.2 have been demonstrated by the Hyperion wastewater treatment plant through consistent compliance with its sludge and discharge limits.

4.2 Local Limits for Oxygen Demanding Pollutants and The National Prohibition Against Interference

High-Strength Organics - The process-related wastewaters discharged to the sewers are not expected to be high enough in organics strength to pose a risk of interference, with the organics strength significantly less than domestic sewage.

Metals and Cyanide - There were no violations of the local limits for arsenic, cadmium, chromium, copper, lead, nickel, silver, zinc, and total cyanide.

4.3 Local Limits for Toxic Metals, Cyanide, and Other Pollutants and The National Prohibition Against Pass-Through

Metals and Cyanide – There were no violations of the local limits for arsenic, cadmium, chromium, copper, lead, nickel, silver, zinc, and total cyanide, although the sample record indicates a very slight possibility of a future violation of the Federal monthly-average standard for lead.

Toxic Organics – There are no local limits for toxic organics.

Oil and Grease – There were no violations of the local limits for oil and grease and none are expected in the future.

4.4 Local Limits for pH and Sulfides, and The National Prohibitions Against Safety Hazards and Corrosive Structural Damage

Corrosion - Sewer collection system interferences related to the formation of hydrogen sulfide and the resulting acidic disintegration of the sewers are possible not expected. The wastewaters discharged to the sewers are not high-strength in biodegradable organics but on at least one occasion the discharge was acidic in nature resulting in a violation of the local limit and national prohibition for pH. The final discharge through IWT Unit D is composed of both untreated wastewaters of unknown and uncontrolled pH and pretreated wastewaters from the other various IWT Units. For this reason, the final discharge through IWT Unit D needs to have increased influent equalization and continuous discharge monitoring. In particular, the 200-gallon inlet sump is too small to provide surge equalization for the nearly 30,000 gpd of wastewater fed through IWT Unit D to the sewers.

Flammability - Flammability would not be expected because sampling shows that the discharges to the sewer entrain negligible amounts of volatile organics.

5.0 Compliance with Federal Monitoring Requirements

Significant industrial users must self-monitor for all regulated parameters at least twice per year unless the sewerage agency monitors in place of self-monitoring. 40 CFR 403.12(e) & 403.12(g).

Each sample must be representative of the sampling day's operations. Sampling must be representative of the conditions occurring during the reporting period. 40 CFR 403.12(g) and 403.12(h).

Permit Requirements - Graphic Research has successfully fulfilled the self-monitoring requirements set forth in the city permit. Over the past two years, the sample record shows that Graphic Research (1) submitted monthly sample results for all permit listed parameters, (2) submitted monthly toxic organics management self-certifications, (3) collected all samples from the designated compliance sampling point, (4) correctly obtained 24-hour composites for metals and grabs for the other pollutants, and (5) followed appropriate chain-of-custody procedures.

Representativeness - The sample record also appears representative of the discharge to the sewers over the sampling day and the six-month reporting period. In particular, sampling as required by the permit is frequent enough to capture the intermittent release of batch treated high-strength wastewaters. Some pollutants present at concentrations well below the Federal standards and local limits do not need to be sampled as frequently as currently required by the permit. However, the self-monitoring for pH should be increased to be continuous given the variable and uncontrolled nature of the wastewaters entering the final treatment unit. Finally, a Federal cyanide compliance point should be established in order to sample just the cyanide-bearing wastewaters.

Requirements

- ***See*** Table 5 of Appendix 2 for the self-monitoring and city monitoring requirements for IWD-495146 that would be considered to be representative of the discharge.

Recommendations

- Self-certification statements should include copies of the hazardous waste manifests documenting the off-hauling of spents, spent static rinses, and residuals.

- ***See*** Sections 4.0 and 4.4 on pages 13 and 14 of this report for findings regarding self-monitoring for pH. ***Also*** see Sections 2.0 and 2.3 on pages 6 and 7 regarding self-monitoring for cyanide.

Appendix 1
Graphic Research - Configuration and Layout

IWT Unit A
Unchelated Metals
acid prep spents
copper plate line rinses
cupric etch rinses
cupric etch spents

IWT Unit B
Chelated Metals
ammonium etch rinses
electroless copper rinses
ammonium etch spents

IWT Unit C – Tin/Lead
solder prep spents / rinses
tin/lead plating rinses
solder strippant spents

IWT Unit CC
Concentrated Copper
microetchant spents
solder strip rinses

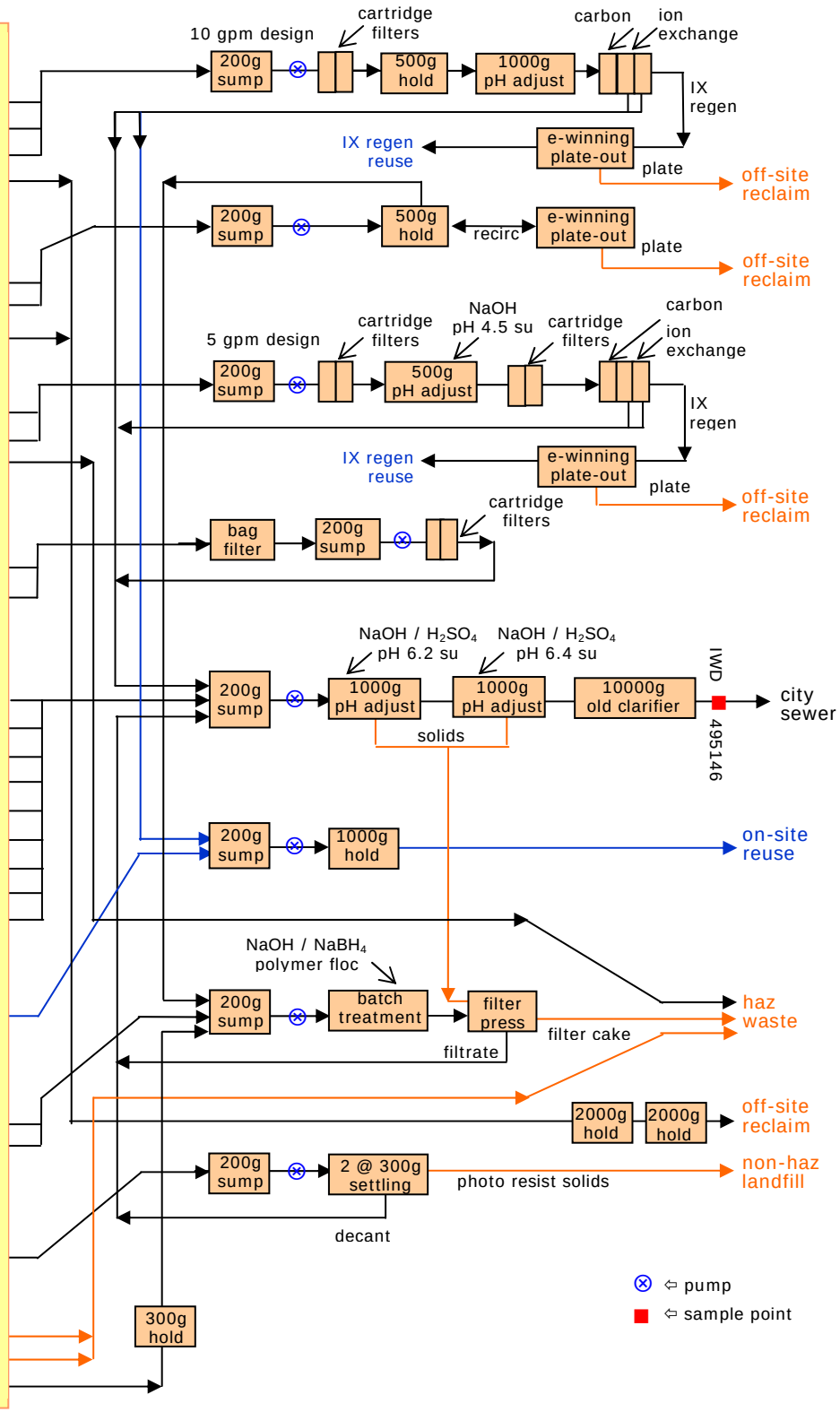
IWT Unit D
Low Strength
glass etch spents / rinses
black oxide line rinses
nickel-gold line rinses
solder flux spents
e-less copper prep rinses
photo resist prep rinses
solder mask / level rinses
alk preps / washdowns
blowdown / cooling water

IWT Unit E
High-Quality Reuse
board conditioner rinses

IWT Unit F
High-Strength Batch
acid prep / catalyst spents
board test reagents

IWT Unit G
Strippants / Alkalines
photo resist spents

Residuals
vacuum blasting slurry
spent cartridge filters
mop waters / spills



Appendix 2 - Table 1
Graphic Research - Tank Inventory, Tank Number, and Volume

gals	Copper / Tin-Lead / Brown Oxide	
140	T3	rack strip
280	T2,T5	pre-rinses
140	T6	microetch
640	T7-10	rinses for T6
420	T11-13	e-less copper plating
980	T14-18	rinses for T11-13
140	T19	palladium catalyst
140	T20	catalyst preparation
140	T21	rinse for T19-20
280	T22,T25	acid activation
420	T23-24	rinses for T22, T25
140	T27	glass etching
140	T28	rinse for T27
140	T29	microetch
280	T30-31	rinses for T29
1410	T41,T42,T46	acid-copper plating
90	T43	spray rinse for T41-42
100	T44	acid activation
90	T45	spray rinse for T44
110	T47	alkaline cleaning
90	T48	spray rinse for T47
110	T49	acid cleaning
90	T50	spray rinse for T49
110	T51	microetch
90	T52	spray rinse for T51
90	T53	acid pre-dip
90	T54	spray rinse for T53
830	T55,T58	acid tin/lead plating
130	T103	vapor blast rinse bleed
50	T230	alkaline cleaning
50	T231-234	acid clean and pre-dip
100	T232-233	rinse for T231
50	T235	black oxide roughener
150	T236-238	rinses for T235
gals	Solder Reflow and Leveling	
25	T139	alcohol bath
50	T138,T140	pre-/rinse for T139
30	T142	hot oil leveling
6	T143,T226	leveling flux
25	T225	acid cleaning
25	T227	microetch
25	T228	spray rinse for T227

gals	Nickel / Gold Plating	
30	T32	hard cyanide gold plating
26	T33	rinse for T32
26	T35	sulfamate nickel plating
10	T181	acid cleaning
10	T182	rinse for T181
10	T183	acid activation
85	T184,185,187	bright nickel plating
24	T186,T188	rinses for T184,T185,T187
50	T189-190	soft cyanide gold plating
20	T191-192	rinses for T189-190
10	T193	acid deactivation
12	T194	spray rinse for T193
gals	Etching / Stripping / Scrubbing	
80	T64	acid solder strip
196	T65-66	spray rinses for T64
70	T81-82	miscellaneous rinses
300	T88	alkaline photo resist strip
140	T89	spray rinse for T88
10	T93	solder stripping
20	T94-95	drag-out rinses for T93
10	T98-99	copper board scrubbing
15	T163	spray pre-rinse
110	T202	cupric ammonium etcher
20	T203	4-stage rinse for T202
60	T204	acid solder preparation
20	T205	spray rinse for T204
250	T212	cupric chloride etching
15	T213	3-stage rinse for T212
170	T215	photo resist stripping
42	T216	2-stage rinse for T215
gals	Photolithography	
60	T31,T63	acid cleaning
-	T51,T80	spray rinses for T31, T63
12	T106	acid cleaning
-	T107-109	spray rinses for T106
220	T110,T113	photo developer
-	T112,T211	rinses for photo developers
3	T154	solder masking table
40	T116-117	rinses for T154
10	T147AB	photo developer and fixer
10	T158	rinse for T147AB
130	T201	photo developer

Appendix 2 - Table 2
Graphic Research - Spent Solutions Generated On-Site

Spent Solutions	Handling	Spent Solutions	Handling
board scrub-glass etching	IWTU-D	photo resist developer	IWTU-G
microetchants	IWTU-CC	photo resist prep	IWTU-F
e-less copper prep-catalyst	IWTU-F	photo resist strippant	IWTU-G
e-less copper activation-plating	IWTU-A	ammonium etchant	Phibro Tech
copper plate acid clean	IWTU-A	cupric chloride etchant	Phibro Tech
copper plate acid activation	IWTU-CC	solder fluxing-masking	IWTU-D
copper plate alkaline clean	IWTU-D	solder strippant-alcohol	Miles Chem
nickel-gold plate acid cleaner	IWTU-F	solder prep	IWTU-C
nickel-gold plate prep	IWTU-A	board cleanliness test reagents	IWTU-F

Appendix 2 - Table 3
Graphic Research – Rinses and Wash Waters Generated On-Site

Rinses or Wash Waters	Handling	Rinses or Wash Waters	Handling
glass etch rinse	IWTU-D	cupric etch drag-out	make-up
e-less plating prep	IWTU-D	cupric etch cascade-spray rinses	IWTU-A
e-less plating rinses	IWTU-B	ammonium etch drag-out	make-up
e-less plating catalyst rinses	IWTU-D	ammonium etch rinses	IWTU-B
copper plating alk prep spray	IWTU-D	photo resist scrub-prep sprays	IWTU-D
copper plating prep rinses	IWTU-A	photo resist strip rinses	IWTU-D
copper plating sprays	IWTU-A	photo resist developer sprays	IWTU-G
microetch rinses	IWTU-A	vapor blast washdown	IWTU-D
tin/lead plating rinse	IWTU-C	solder strip rinses	IWTU-CC
black oxide line drag-outs	make-up	solder prep rinses	IWTU-C
black oxide line rinses	IWTU-D	solder strip drag-outs	IWTU-CC
nickel-gold plate line rinses	IWTU-D	solder mask wash table	IWTU-D
sawing-polish-sanding washdown	IWTU-D	solder leveling rinses	IWTU-D
laboratory sink washdown	IWTU-D	final board scrubber rinses	IWTU-D
photo developer washdown	IWTU-D	board conditioner-dryer rinses	IWTU-E

Appendix 2 - Table 4
Graphic Research - Residuals Generated On-Site

Residual	Handling	Residual	Handling
photo resist drum filter peels	landfill	spent filter cartridges	landfill
spent vacuum blasting slurry	haz waste	filter press cake	haz waste
electrowinning plate-out	reclaim		

Appendix 2 - Table 5
Sewer Discharge Standards and Limits for Graphic Research @ IWD-495146

Pollutants of concern	Federal standards (d-max)	Federal standards (mo-avg)	national prohibition (instant)	local limits (instant)	monitoring frequency for IWD-495146 ⑥ discharger	city
arsenic	-	-	-	3.0	③	③
cadmium	0.11	0.07	-	15.0	**1/six-mos**	1/six-mos
chromium	2.75	1.70	-	10.0	1/month	1/six-mos
copper	3.36	2.06	-	15.0	1/month	1/six-mos
lead	0.69	0.43	-	5.0	1/month	1/six-mos
nickel	3.95	2.36	-	12.0	1/month	1/six-mos
silver	0.43	0.24	-	5.0	**1/six-mos**	③
zinc	2.59	1.48	-	25.0	1/month	1/six-mos
total cyanide	0.07 ④	0.07 ④	-	10.0	**1/six-mos**	1/six-mos
amenable cyanide	-	-	-	2.0	③	③
total toxic organics	2.12	-	-	-	1/month ⑤	1/year
dissolved sulfides	-	-	-	0.10	③	③
oil and grease (total)	-	-	-	600	③	**1/year**
flow (gpd)	-	-	-	-	daily	-
pH (s.u.)	-	-	<5.0	5.5-11.0	***continuous***	1/six-mos
explosivity	-	-	<140°F ①	②	③	③

① Closed-cup flashpoint
② Narrative prohibition against the introduction of flammable or explosive substances
③ As part of periodic priority pollutant scans in order to identify changes in discharge quality
④ Threshold value set by the City of Los Angeles for IWD-495146. The values for solely the cyanide-bearing rinses would be 1.20 mg/l daily-max and 0.65 mg/l monthly-average.
⑤ Monthly self-certification to following the approved toxic organics management plan is allowed in lieu of self-monitoring.
⑥ Recommended **reductions in green**. Recommended ***increases in red***.

Appendix 2 - Table 6
July 2006 - July 2008 Sample Record for Graphic Research @ IWD-495146

pollutants (µg/l)	effluent sampling results				violation rate ③			sample count
	mean	99th%	min	max	d-max	mo-avg	instant	
arsenic	4.0	12.4	<3	20	-	-	0/32	32
cadmium	4.9	19.3	<0.3	30	0/34	0/25	0/34	34
chromium	4.4	7.4	3	6	0/33	0/25	0/33	33
copper	1347.1	4748.0	230	5830	**2 / 34**	**2 / 25**	0/34	34
iron	226.6	411.8	128	363	-	-	0/8	8
lead	141.1	387.4	<50	542	0/33	0/25	0/33	33
molybdenum	8.8	19.9	1	16	-	-	0/8	8
nickel	60.8	262.8	5	370	0/33	0/25	0/33	33
silver	11.5	29.6	1	50	0/33	0/25	0/33	33
zinc	154.8	832.9	<20	1250	0/33	0/25	0/33	33
total cyanide	8.3	35.7	<4	47	0/30	0/25	0/30	30
amenable cyanide	5.3	26.3	<4	14	-	-	0/30	30
total toxic organics	23.7	-	1.1	46.2	0/25 ①	-	0/2	2 ①
dissolved sulfides	11.7	50.1	<30	80	-	-	0/31	31
chloride (mg/l)	64.3	164.4	18	245	-	-	-	31
oil+grease - petro (mg/l)	9.4	22.4	3	30	-	-	0/31	31
flow (gpd)	28150	37785	19552	67044	-	-	-	586
pH (s.u.)	7.2 ②	-	3.0	9.5	-	-	**1 / 33**	33
explosivity	-	-	-	-	-	-	-	-

① Monthly self-certifications to following an approved toxic organics management plan.
② pH median
③ The list of violations by sample date and the violation probabilities follow below.

sample dates	type	sampler	standards / local limits		violation	days
12/17/07	24-hour	POTW	Fed d-max - copper	3.36 mg/l	4.85	1
Dec 2007	24-hour	POTW + IU	Fed mo-avg - copper	2.06 mg/l	3.11	31
08/02/07	24-hour	IU	Fed d-max - copper	3.36 mg/l	5.83	1
Aug 2007	24-hour	IU	Fed mo-avg - copper	2.06 mg/l	5.83	31
08/24/06	grab	POTW	Local limit - pH	5.5 su.	3.0	1

violation probability	mean (µg/l)	std dev (µg/l)	statistical probability	percent
Fed d-max - copper	µ = 1347.1	σ = 1202.1	α(3360) = 0.0475	~5%
Fed mo-avg - copper	µ = 1316.0	σ = 1133.2	α(2060) = 0.2557	~25%
local instant - pH	med = 7.2		α(5.5) = 0.0576	~6%