



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX – PACIFIC SOUTHWEST REGION  
75 Hawthorne Street  
San Francisco, CA 94105-3901**

Feb 02, 2012

In Reply Refer To: WTR-7

Ms Toni DeAnda  
Operations Manager  
Pyramid Circuits  
1405 Richard Avenue  
Santa Clara, CA 95050

Re: August 16, 2011 Clean Water Act Inspection

Dear Ms DeAnda:

Enclosed is the February 1, 2012 report for our inspection of Pyramid Circuits at the above address in Santa Clara, CA.

The main findings are summarized below:

1. This facility is subject to the federal categorical standard for metal finishing, 40 CFR 433, because of its printed circuit board manufacturing, in addition to the metal finishing operations of electroplating, electroless plating, and chemical etching.
2. In 2008 and 2010, the facility violated federal and local limits for copper, lead, and total cyanide on a total of three sampling dates. The facility is currently under a compliance agreement with the City and has completed most of the requirements. The facility has been granted an extension, until February 29, 2012, for implementing the proposed upgrades to the pretreatment system.
3. The facility likely uses complexing agents in its electroless plating baths and ammonia etcher. The facility should have addressed this issue in its pretreatment system evaluation.

By March 15, 2012, please submit a short response letter to the Summary of Findings in Section 3.0 of this report. Your letter should include an individual response to each of the numbered findings in Section 3.0.

Please send your letter to the attention of Anna Yen at EPA (and include the code "WTR-7" in the address above), with copies to the City of San Jose - Environmental Services Department and to the San Francisco Bay Regional Water Quality Control Board.

We would like to thank you for your cooperation during the inspection. If you have any questions, please call Anna Yen at (415) 972-3976 or e-mail her at [yen.anna@epa.gov](mailto:yen.anna@epa.gov).

Sincerely,  
<Original  
signed by>

Ken Greenberg  
Chief, Clean Water Act Compliance Office

Enclosure

cc (enclosure by email):

Rene Eyerly, City of San Jose, Environmental Services Department  
Michael Chee, Regional Water Quality Control Board, San Francisco Bay Region

**U.S. Environmental Protection Agency  
Region 9  
Clean Water Act Compliance Office**

**Industrial User Inspection Report**

**Industrial User:** Pyramid Circuits  
**Industrial User Address:** 1405 Richard Ave., Santa Clara, CA 95050

**Inspection Date:** August 16, 2011

**EPA Region 9 Inspector:** Anna Yen, Environmental Engineer  
Water Division, CWA Compliance Office

**City of San Jose Inspector:** Liz Tyson, Environmental Inspector I

**Facility Contacts During Inspection:** Lucio DeAnda, President  
Raul DeAnda, Sales Representative

**Report Date:** February 1, 2012

*Report prepared by Anna Yen*

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## **1.0 Scope and Purpose**

The purpose of the industrial user inspection on August 16, 2011 was to determine the pretreatment standards and requirements that apply to this facility and to evaluate compliance with those standards and requirements.

This facility is an industrial user which discharges to the local publicly owned treatment works (POTW), the San Jose/Santa Clara Water Pollution Control Plant.

### **1.1 General and Process Description**

Operations began at this facility in approximately 1981. Pyramid Circuits ("Pyramid") manufactures printed circuit boards. It does not own any of the products it manufactures. As defined in 40 CFR 433.11(d), Pyramid is an independent manufacturer of printed circuit boards.

The facility receives a file from the customer which contains the data necessary to

manufacture the printed circuit boards. Pyramid receives the materials for the boards, the majority of which are gold with nickel added to it. Some boards also have tin-lead solder or lead-free solder. All boards have a base of copper. Pyramid orders thin sheets of fiberglass, coated with copper, as the starting raw material for the panels. Pyramid will then place rows of boards on each panel.

In the drill room, the fiberglass is cut to the appropriate size for panels in the shearing machine. It is then drilled with holes in one of three drilling machines. Each of these machines has a cooling system that uses coolant in a closed loop. No water is used in this room.

The fiberglass panels are then sent through one of two routers, to score the outline of each board on the panels. The router machines are air-cooled. Again, no water is used for this part of the processing.

#### Metal Finishing Room - Part 1

In this room, the metal finishing tanks sit on top of floor grating, which sits above the secondary containment. The secondary containment area is surrounded by a concrete curb. All dragout and liquids in the secondary containment drain to a centrally located sump below the floor grating. A sump pump pumps this liquid to the onsite wastewater treatment system. *See Photos 1-3 in Attachment 1.*

The facility performs electroless plating of copper, electroplating of copper, and electroplating of tin-lead, in addition to chemical etching, acid cleaning, and alkaline cleaning.

The facility used to have a gold plating process line, but that line was removed several years ago. In a letter to the City of San Jose, Pyramid stated that it ceased operations of its gold plating line on April 15, 2008. The last shipment of cyanide waste hauled offsite, however, occurred in April 2011.

After electroless plating of copper, for example, to plate the newly-drilled holes on the panels, the panels are sent through a machine called a scrubber. This machine has rotating brushes that clean off the panel. Water is used in this process. The used water collects in a bin, which is piped to the onsite wastewater treatment system. *See Photos 4-6 in Attachment 1.*

A sink in the room is used for washing off oil. Pyramid stated that only tin-lead boards are dipped in the oil bath to make the boards look shiny. The sink drains to the onsite wastewater treatment system.

### Dry Film Room

A dry film machine is used to heat film which makes the film stick to the panel's surface. The panel is then placed in another machine, an exposure unit, that uses light to expose the film in a certain pattern. Both of these machines are air-cooled and use no water.

The panel is then placed in a developer. This machine uses a solution made up of potassium carbonate and water to spray onto the panel. The solution essentially burns off the completely transparent portions of the film, based on the pattern that was created on the film in the exposure unit. *See Photos 7-8 in Attachment 1.*

Another method that the facility uses to create the pattern on the film is hand imaging. An employee manually uses a stencil and pours some blue ink over it and the film-covered panel. The employee then uses a squeegee to remove the excess ink. The panel is then placed in an oven.

The screen that was used in the above process is washed with water and a chemical stripper, using a spray wash. Bleach is then applied, followed by regular dishwashing liquid and water. The screen washing is performed in a sink. The solutions and wastewater are discharged down the sink drain which leads to the onsite wastewater treatment system. *See Photos 9-12 in Attachment 1.*

### Metal Finishing Room - Part 2

The panels go back into the metal finishing room to remove layers. The panels are processed through an ammonia etcher machine to remove exposed areas of copper. The etcher machine applies an alkaline etchant to the panel, then rinses the solution off with water. The panels are also immersed in a film stripper tank, which contains a monoethanolamine solution, to remove the film. *See Photos 13-16 in Attachment 1.*

### Replacement of Tank Contents

For the ammonia etcher machine, Pyramid removes a portion of the alkaline etchant periodically and adds about the same amount of fresh etching solution into the machine. The spent solution is hauled away for offsite disposal. The discharged rinse waters are hard-piped to the onsite wastewater treatment system.

For adding to the ammonia etcher machine, a drum of etchant was sitting on the concrete floor, partially on top of some floor grating. The drum did not have its own secondary containment. Any spills from the drum would enter directly into the secondary containment area for the metal finishing room, flow to the central sump, and ultimately to the onsite continuous wastewater treatment system. Spills could be problematic for effective performance of the continuous wastewater treatment system.

Pyramid informed us that the contents of the film stripper tank are replaced “when it doesn’t work anymore.” The contents are pumped out with a sump pump and hose, and the tank is manually filled with new film stripper solution. The spent stripper solution is batch treated in the onsite wastewater treatment system.

Pyramid has the contents of electroplating process tanks analyzed once per month. Pyramid stated that it generally only adds to these tanks. Approximately once a year, Pyramid will clean these tanks by pumping the liquid out of the tank through a carbon filter. Then it pumps the filtered liquid back into the tank. Pyramid stated that it has never had to haul off the liquid for offsite disposal. Pyramid collects the used filters in a drum and has the filters periodically hauled away for disposal as hazardous waste. Sludge buildup in tanks is also hauled away for offsite disposal.

For the electroless plating process tanks, Pyramid stated that it replaces the contents based on the number of panels that have been processed through the tanks. The tank contents are batch treated in the onsite wastewater treatment system.

In general, rinse tanks for electroplating are set up as two rinse tanks in series. The first rinse tank is a static rinse. These rinse waters are periodically sent to be batch treated in the onsite wastewater treatment system. The second rinse tanks are hard-piped to the onsite continuous wastewater treatment system.

#### Onsite Wastewater Treatment System

See Section 1.3

### **1.2 Facility Wastewater Sources**

Pyramid Circuits generates the following wastewaters:

- First (static) rinses
- Spent electroless plating baths
- Spent film stripper solution
- Spent developer solution
- Second rinses
- Liquids collected in floor sump in plating room
- Rinses from ammonia etcher
- Discharges from sinks in process areas
- Used water from scrubber machine

The first four listed wastewaters are sent to an onsite batch treatment system. Once the treated wastewater is checked with a test kit for metals of concern, such as copper, and the levels are found to be in compliance with permit limits, then the wastewater is sent to the onsite continuous treatment system. The last five listed wastewaters above are also sent to the onsite continuous treatment system.

Once processed through the onsite continuous wastewater treatment system, the treated wastewater is discharged to the local sewer system.

EPA notes Pyramid's positive practices of implementing efficient water use: analysis of electroplating tanks on a regular basis which avoids excessive chemical addition resulting

in less waste disposal (whether in liquid or solid form); using filters on the electroplating baths so that only the filters, and not the baths, need to be disposed of offsite as hazardous waste; and using static rinse tanks, as the first in a configuration of two rinse tanks in series. EPA encourages Pyramid to continue its efforts and consider additional efficient water use practices, such as equipping rinse tanks with hang bars, reusing rinse water for makeup of process baths, and countercurrent rinse tank configurations where applicable, just to name a few options.

### **1.3 Facility Process Wastewater Treatment System**

#### Batch Treatment

Some of the facility's more concentrated wastewaters are sent to a batch treatment system prior to commingling with the other wastewaters for treatment in the continuous treatment system. The batch treatment system consists of 3 large drums which are agitated with air. Pyramid adds caustic to adjust the pH to between 10 and 11 and adds polymer for flocculation. Pyramid then checks the treated wastewater with a test kit for metals of concern, such as copper. If Pyramid finds that the levels are too high, then the wastewater undergoes an additional cycle of batch treatment. If the levels are in compliance with permit limits, then the wastewater is pumped via a hose to the concrete pit where wastewater is collected prior to continuous treatment.

#### Continuous Treatment

A concrete pit collects wastewater that is piped from the plating area as well as the batch-treated wastewater that is pumped over by hose. Polymer and ferric sulfate are added to the pit for coagulation and flocculation. Caustic soda is added for pH adjustment to between 9 and 10. One 55-gallon drum of polymer and one 55-gallon drum of ferric sulfate sit on the concrete directly above and next to the concrete pit grating. The chemicals are added manually by drum pump and hose. Caustic soda is added simply by tipping a small tote on its side and letting it drip through the grating into the concrete pit. Pyramid checks the pH by pulling a sample from the concrete pit as well as a tap from the holding tank (which is located immediately upstream of the Lamella clarifier). Based on the pH results, Pyramid manually adjusts the amount of caustic soda addition. We understand that Pyramid is in the process of changing this operating procedure.

The wastewater is then pumped to a settling tank, and from there, it flows by gravity to a holding tank. The wastewater is then sent to a Lamella clarifier where most of the sedimentation occurs. The effluent is directed to a tank that serves as the permitted sample point. The treated wastewater discharges continuously from the tank to the local sewer system. The bottoms from the Lamella clarifier are sent to a filter press. Filtrate is sent back to the concrete pit for continuous treatment again. The filter cake is hauled away for offsite disposal.

### **1.4 Wastewater Discharge**

Wastewater from this facility discharges to the San Jose/Santa Clara Water Pollution

Control Plant. As lead agency of a regional joint powers authority, the City of San Jose operates the wastewater treatment plant, which is subject to requirements under an NPDES permit (No. CA-0037842) issued by the San Francisco Bay Regional Water Quality Control Board.

## **2.0 Compliance with Federal Categorical Standards**

This facility is subject to the federal categorical standard for metal finishing, 40 CFR 433. Therefore, it is a categorical industrial user (CIU). The electroplating, electroless plating, chemical etching processes, and printed circuit board manufacturing performed at this facility trigger applicability of this categorical standard.

The City of San Jose has permitted this facility as a new source, listing the “Pretreatment standards for new sources” in 40 CFR 433.17 as the applicable federal limits. An industrial user is subject to the federal categorical standard for metal finishing if it performs any of the following six core operations listed in 40 CFR 433: electroplating, electroless plating, chemical coating, chemical milling/etching, anodizing, and printed circuit board manufacturing.

The facility has violated federal limits for total cyanide, copper, and lead on three sampling dates over the past several years: twice in 2008, and once in 2010. EPA reviewed compliance monitoring data for the regulated metals over the time period of August 17, 2008 through August 17, 2011, and found one violation each for copper and lead. Because Pyramid ceased operation of its gold plating line in April 2008, EPA reviewed a different time period of compliance monitoring data for total cyanide. Of cyanide monitoring data from January 2006 through April 2008, EPA found one violation of the federal total cyanide limit. *See Attachment 2 for the compliance monitoring data for copper, total cyanide, and lead.*

### **2.1 Compliance with Other Federal Pretreatment Requirements**

This facility is a categorical industrial user (CIU) and, therefore, is also a significant industrial user (SIU) because it is subject to a federal categorical standard. Like any industrial user, it must comply with pretreatment requirements in 40 CFR 403, including, but not limited to, national prohibitions in 40 CFR 403.5 and reporting requirements in 40 CFR 403.12. Note that some requirements in 40 CFR 403 are applicable specifically to SIUs and some even more specifically to CIUs.

### **2.2 Compliance with Local Limits and Actions by the City**

The facility's most recent pretreatment permit issued by San Jose is Permit No. SC-009B. The facility's sample point, as indicated in a diagram and by description in the permit, is “located in the waste treatment area on the outside right of the building after all treatment, and immediately prior to final discharge to the sanitary sewer.” Based on observations during the inspection, the sample point is, specifically, a small holding tank



which is located directly downstream of the Lamella clarifier. The facility's permit requires Pyramid to sample semiannually.

For the time periods reviewed by EPA, Pyramid violated local limits for copper, lead, and total cyanide based on the same samples which showed violations for the corresponding federal limits. *See Attachment 2 for the measured copper, lead, and total cyanide levels on these dates of violation.* The City issued enforcement notices for those violations.

The City held a compliance meeting with Pyramid in May 2011. As a result of the meeting, Pyramid is currently under a compliance agreement. Key requirements of the compliance agreement include submittal of an evaluation of the pretreatment system and of chemical handling procedures, a standard operating procedure (SOP) for the pretreatment system, and a slug control plan. Pyramid must also establish and maintain a pH calibration and pH cleaning log. All requirements had a deadline of August 30, 2011. Though submitted after the deadline, Pyramid submitted the pretreatment system evaluation, which included some recommendations for upgrading the pretreatment system. The City accepted those recommendations and required the facility to proceed with implementation of those upgrades. Prior to the implementation deadline of December 24, 2011, the City received a request from Pyramid for an extension to the deadline. The City granted Pyramid an extension until February 29, 2012.

Pyramid also received an extension for submittal of the SOP and slug control plan. The facility sent in the submittals on time by the new deadline of October 26, 2011. Pyramid has implemented a pH cleaning/maintenance log and is hiring an outside service provider to perform pH probe calibrations.

EPA notes that chelating, or complexing, agents are used in electroless plating baths. Though Pyramid batch treats spent electroless plating solutions, the effluent from the batch treatment system is sent to the continuous treatment system. In addition, ammonia and ammonium hydroxide, one of which could be a component used in the facility's ammonia etcher, are complexing agents. Though Pyramid has spent etchant hauled offsite, the associated rinse waters are sent to the onsite continuous wastewater treatment system. Pyramid should be aware that complexing agents tie up metals, preventing metals from precipitating from solution and, thus, often leading to unsuccessful wastewater treatment by hydroxide precipitation treatment methods. Pyramid should have addressed this issue in its pretreatment system evaluation.

### **3.0 Summary of Findings**

1. This facility is subject to the federal categorical standard for metal finishing, 40 CFR 433, because of its printed circuit board manufacturing, in addition to the metal finishing operations of electroplating, electroless plating, and chemical etching.
2. This facility is an SIU and a CIU. The facility is subject to applicable pretreatment requirements in 40 CFR 403.

3. In 2008 and 2010, the facility violated federal and local limits for copper, lead, and total cyanide on a total of three sampling dates.
4. The facility is currently under a compliance agreement with the City. The facility has completed most of the requirements, including having an evaluation performed of its pretreatment system. The facility has been granted an extension, until February 29, 2012, for implementing the proposed upgrades to the pretreatment system.
5. The facility likely uses complexing agents in its electroless plating baths and ammonia etcher. The facility should have addressed this issue in its pretreatment system evaluation.

## Attachment 1: Photos



**Photo 1**

Cleaning line in metal finishing room  
*Taken by Anna Yen on August 16, 2011*



**Photo 2**

Floor sump in metal finishing room  
*Taken by Anna Yen on August 16, 2011*



**Photo 3**

Discharge hose from floor sump to rinse tank  
(to wastewater treatment system)  
*Taken by Anna Yen on August 16, 2011*



**Photo 4**

Scrubber machine  
*Taken by Anna Yen on August 16, 2011*



**Photo 5**

Scrub machine – view showing water bin  
*Taken by Anna Yen on August 16, 2011*



**Photo 6**

Discharge pipe from water bin of scrub machine  
*Taken by Anna Yen on August 16, 2011*





**Photo 7**

Developer machine

*Taken by Anna Yen on August 16, 2011*



**Photo 8**

Discharge piping from developer  
through wall to wastewater treatment system

*Taken by Anna Yen on August 16, 2011*



**Photo 9**

Sink for washing screens

*Taken by Anna Yen on August 16, 2011*



**Photo 10**

Second sink

*Taken by Anna Yen on August 16, 2011*



**Photo 11**

Drain pipe from first sink

*Taken by Anna Yen on August 16, 2011*



**Photo 12**

Drain pipe from second sink  
-- through wall to wastewater treatment system

*Taken by Anna Yen on August 16, 2011*





**Photo 13**

Ammonia etcher machine

*Taken by Anna Yen on August 16, 2011*



**Photo 14**

Ammonia etcher machine

– view of compartment of etchant

*Taken by Anna Yen on August 16, 2011*



**Photo 15**

Water rinse discharge line from  
ammonia etcher machine

*Taken by Anna Yen on August 16, 2011*



**Photo 16**

Film stripper tank

*Taken by Anna Yen on August 16, 2011*

## Attachment 2: Compliance Monitoring Records Review

Permit Limits in mg/L (Federal Categorical Limits Adjusted for Dilution Flows):	Copper	Lead	Cyanide (Total)
Daily	3.38	0.69	1.20
Monthly	2.07	0.43	0.65
	Measured Levels (mg/L)		
Sample Date (1 <sup>st</sup> day of composite sample)	Copper	Lead	Cyanide (Total)*
5/19/11	0.331	0.06	
2/22/11	1.25	0.28	
11/17/10		0.01	
11/12/10	0.022	0.03	
10/22/10	0.011	<b>0.68</b>	
7/21/10	ND	0.03	
5/25/10	0.240	0.10	
2/4/10	0.05	ND	
11/20/09	1.21	0.19	
8/5/09	0.06	ND	
5/27/09	0.878	0.26	
1/20/09	0.04	ND	
12/10/08	0.890		
12/2/08	0.14		
11/4/08	<b>2.85</b>	0.16	
3/9/08			<b>0.76</b>
1/8/08			0.36

\* Though EPA reviewed cyanide monitoring records from January 2006 through April 2008, EPA only listed compliance monitoring data starting in 2008 for the purposes of this table. The only violation of the federal cyanide limit during the review period is listed in the table. Pyramid Circuits ceased operation of metal finishing operations using cyanide in April 2008.

Key:

**xxx** Out of compliance with federal daily and/or monthly limit (adjusted) of 40 CFR 433.17