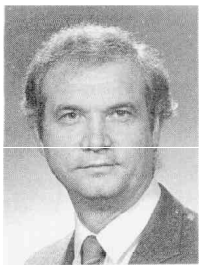
The Odyssey— Obtaining a Variance from EPA

By Frank Altmayer, CEF



In the summer of 1989, two Chicago job shop electroplating companies embarked on what proved to be quite a journey and learning experience; one from which we can all learn something.

Each company generates an F006 filter cake that contains high concentrations of complexed iron cyanides, and each company was faced with the impossibility of disposing of its wastes after the big "ban" went into effect (40CFR 268.11).

The most logical option for each company appeared to be petitioning the U.S. Environmental Protection Agency (EPA) for an "Administrative Variance" (the "deli sting" option was deemed too expensive and potentially time-consuming). Reference to administrative variance petitions can be found in *Federal Register,* Vol. 54 No. 120, 6/23/89, and *Federal Register,* Vol. 53, 8/17/88, page 31199. The major difference between an administrative petition and a delisting petition was thought to be that EPA did not need to go through "rule making" for the former, making the process less time-consuming (and time was definitely on the minds of these companies). "Rule Making" means the EPA has to propose its intended action in the *Federal Register,* ask for public comment, respond to the comments, etc., etc. One can readily see how the process can take years.

The companies hired a consultant and a laboratory and began their journey. On October 27, 1989, the petitions were completed and submitted to the EPA. The following elements constituted these petitions:

1. Address: Waste Treatment Branch, Office of Solid Waste, USEPA, 401 M St., SW, Washington, DC 20460.

2. Variance Request: Company "XYZ" requests the EPA to grant a site-specific variance from the F006 treatment standard promulgated under 40 CFR 268.11 (second third of the schedule of restricted hazardous wastes), specifically total cyanide limitation of 590 mg/Kg. This request is for an administrative variance (without rule making).

3. Authority: The EPA has the authority to grant a site-specific variance from the treatment standard administratively (without rule making), per *Federal Register,* Vol. 53, page 31199, 8/17/88.

4. Background: The Agency promulgated the treatment standard for F006 waste based on data submitted by one commercial treatment facility (Cyanokem). The data consisted of a total of 14 waste samples treated over a 30-day period by the treatment facility. Only two of the 14 waste samples used for a data base contained materials that were classified as F006 and those two samples were blended with concentrated liquid cyanide wastes prior to treatment by Cyanokem. One waste was blended approximately 90 percent by volume liquid concentrated cyanide waste (F012) with approximately 10 percent F006. The second blend consisted of 990 gal F006 plus 1,100 gal of F012. Because Cyanokem was able to treat these blends successfully to below the proposed 590 mg/Kg total cyanide level, the EPA promulgated the standard for all F006 wastes. None of the Cyanokem data provided cyanide amenable to chlorination data, yet the EPA chose to set a CN-ATC limit of 30 mg/Kg based on the variability of the analytical procedure. used for its determination. None of the Cyanokem data provided information indicating that the F006 waste blended with F012 was typical of F006 filter cake generated by the electroplating industry.

Exhibit 1: Basis for Variance Request

The subject company making this variance request performs job shop electroplating using cyanide based electroplating solutions. The majority of the basis metals plated are ferrous.

The subject company operates a waste treatment system in order to meet sewer discharge regulations enforced by the EPA. The waste treatment system uses alkaline chlorination for destruction of cyanides in accordance with the EPA guidance documents. The petitioning company is in consistent compliance with the EPA pretreatment regulations.

Exhibit 2: Description of Facility

The facility description included data on the number of tanks and gallonage using cyanide, the square footage of parts plated that were made of ferrous vs. non-ferrous metals, and the general nature of the business and its customers.

Exhibit 3: Plant Diagram & Treatment Data At Various Points

The purpose of this data was to demonstrate that the plant has a well-operated treatment system for its wastewater. Analyses for total, ATC and reactive cyanide were originally submitted. EPA made subsequent requests for iron analyses and records on the purchase of cyanide and sodium hypochlorite (to verify that enough hypochlorite was purchased to destroy the cyanide based on the chemical reaction stoichiometry). The submitted data covered:

- Rinsewater prior to chlorination
- Rinsewater after chlorination (but prior to clarification)
- Rinsewater after clarification

Typical destruction efficiencies reported were ±99 percent of total cyanide and 100 percent of cyanide amenable to chlorination.

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Additional Exhibits

Along with the above information, each company made similar additional arguments in support of its petitions:

A. The subject company has made an extensive effort to reduce the quantity of complexed iron cyanides in its raw wastestream by lining steel tanks containing cyanide solutions with rubber. At the present time, only 32 percent of steel parts plated by the subject company are plated in unlined tanks. It is well-known by the EPA and by the plating industry that the bulk of iron cyanide complexes are formed when steel parts are plated in cyanide solutions.

B. EPA has gone on the record stating, "The Agency believes that the source of the high iron concentration in these wastes may be due to the fact that these wastes are generated from the electroplating industry and that the material being plated is steel. The iron contained in steel is replaced with the metal contained within the electroplating baths (for example zinc in zinc cyanide plating baths). The iron that is thus released is believed to then react with the cyanide to form compounds that are referred to as iron complex cyanides." Therefore, elimination of all unlined tanks will not significantly reduce the quantity of complexed iron cyanides generated. A study made by the petitioner indicated that lined tanks containing cyanide contain about the same amount of insoluble ferrocyanides as unlined tanks.

C. Analytical data on the F006 filter cake generated by the petitioner is enclosed as part of this petition. The total cyanide in this waste can only be ferro-ferri cyanides since the subject company employs cyanide plating of ferrous substrates and EPA is well aware that such processes produce cyanide residuals in the F006 filter cakes from waste treatment. Wastewater cyanides that can be chlorinated are destroyed by the alkaline chlorination system employed by the company at 98.5 percent efficiency. The F006 filter cake generated by the company contains no leachable cyanide when tested with the TCLP leach procedures. EPA has gone on record (see *Federal Register,* Vol. 54 No. 146 8/1/89, stating that "if the cyanide present in Clay's waste was not tightly bound, the levels of leachable and free cyanides would have been higher."

D. EPA also makes the following statements regarding cyanides complexed with iron:

- "Ferricyanides and ferrocyanides are expected to be extremely stable and insoluble in water. "
- "Constituents of concern are tightly bound in the waste matrix and thus are not available for leaching."
- "The stability constants of ferricyanide and ferrocyanide are on the order of 10^{62} and 10^{47} respectively. See Broderius S.J. 1973."
- "EPA believes these immobile iron-cyanide complexes do not present a threat to human health via ingestion of contaminated drinking water (See *Federal Register,* Vol. 53 page 36075, 9/16/88). However, the agency does not believe that it is possible to reduce the level of cyanide present in waste using chemical oxidation technologies, including electrolytic oxidation, alkaline chlorination, wet air oxidation and ozonation. "
- "If the cyanide is present in water as a tightly bound complex ion (e.g. ferrocyanide) then chemical oxidation will treat the cyanide only to a limited extent."

E. The F006 filter cake generated by the subject company originates from operations similar to those generating the waste that the EPA delisted in the above referenced issue of the *Federal Register.* It is approximately 30 percent solids and the cyanides present are ferro/ferri cyanides. The EPA modeling of the Clay waste indicated that "The EPA does not believe that any other factor, including elevated total constituent concentrations of the constituents of concern, could cause this wastestream to present a hazard to human health and the environment." The same statement could be made about the F006 waste generated by the petitioner.

F. The EPA promulgated 590 mg/Kg total cyanide and 30 mg/Kg cyanide amenable to chlorination standards without a data base that included F006 filter cakes generated from well-operated waste treatment systems that are employed by electroplating operations that involve a significant amount of electroplating and ferrous substrates with cyanide solutions and contain high concentrations of total cyanide as ferri-ferro cyanide complex.

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G. The EPA implicitly agreed that sunlight exposure to complexed iron cyanides is not a concern in granting the delisting of a similar F006 waste generated by Clay Equipment Corporation of Cedar Falls, Iowa, Clay stored its F006 solid waste containing complexed iron cyanides above ground for 12 years and the EPA noted that no environmental problems resulted. We know of no data that clearly demonstrates that sunlight will decompose the ferro cyanides in an F006 filter cake, and we believe such data does not exist.

H. The Agency has gone on record stating that, "The Agency agrees that the high concentrations of iron in the cyanide wastes (when present as iron-cyanide complexes) appear to effect (SIC) the level of cyanide destruction that is achievable. At this time, however, the Agency has not determined a specific concentration of iron in these wastes that would indicate a difference in treatability for these cyanides."

We submit that there is no need to determine a specific concentration of iron in the petitioner's case. It is clear that the F006 waste generated by the petitioner contains difficult-to-treat, complexed, stable, iron cyanide. The following data is submitted as additional support for this statement:

- **The subject company has 7,500 gal of electroplating solutions, of which 6,400 gal (85.3 percent) are cyanide plating solutions.**
- **Of the 6,400 gal of cyanide, 4,300 gal (67.2 percent) are contained in lined or non-ferrous tanks.**
- **Only 32.8 percent of the plated parts are processed in unlined steel tanks with cyanide as the electrolyte.**

Ž The subject company has made a concerted effort in limiting the potential formation of complexed iron cyanides in its process, and is destroying cyanides in its wastestream at extraordinary efficiency.

Ž Dollar sales generated by cyanide plating on steel parts represent more than 75 percent of total sales. The company cannot economically survive without plating on steel with cyanide solutions.

The odyssey continues next month. •