

# Wastewater Treatment Forum

## Addresses Old & New Problems

The Wastewater Treatment & Recycling Forum continued to be a popular event at the AESF/EPA Conference for Environmental Excellence. Edited excerpts of some questions and answers appear here.

The forum moderator was Tom Martin, CEF, Delta Chemicals & Equipment, Inc., Indianapolis, IN. Panelists were: Frank Altmayer, CEF, Scientific Control Laboratories, Chicago, IL; Lyle Kirman, Kinetic Engineered Systems, Newbury, OH, Dr. Fred Reinhard, Eagan, MN; and Jeffrey Lord, CEF, Mayer Associates, Erie, PA.

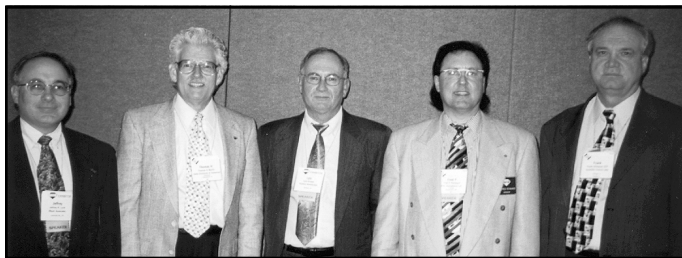
Thanks and congratulations to the panelists for an outstanding job.

### Nickel Headaches

**Question:** We operate a line for plating nickel and chrome, which discharges to a small POTW. Our facility represents 50 to 70 percent of the flow that goes to this POTW. Recently, the POTW's sludge has accumulated nickel to a level where it cannot be sent to landfill any longer. I am told that the extended aeration process there is good for receiving metal waste. Is there a method to remedy this without taking the nickel out of the waste?

**Panelist one:** POTWs generally remove metals in their activated sludge process, but it then becomes part of the sludge they produce. EPA has placed strict regulations on how much metal can be in the sludge a POTW disposes as non-hazardous material, and it looks like your discharge is causing your POTW to exceed those limits. There is no "fix" at the POTW for this condition. You must work at your end to identify the sources of nickel, qualify their contribution to the metal in the discharge, and then work at recycling/recovering nickel at the most prominent sources, which typically are rinses after plating and stripping.

Recycle/recovery technology on nickel-bearing wastes that can be investigated include reverse osmosis, evaporation, ion exchange and electrolytic systems—no specific order of preference.



Panelists for the Wastewater Treatment Forum were (l-r): Jeffrey Lord, CEF, Tom Martin, CEF, Lyle Kirman, Dr. Fred Reinhard and Frank Altmayer, CEF.

**Panelist two:** You can also see if the wastewater treatment system is adequately removing nickel, and possibly improve nickel precipitation through the optimization of settling pH, use of better/different polymers, and possibly addition of small amounts of DTC, which produces a nickel sulfide sludge in addition to the hydroxide, resulting in lower nickel concentration from the clarifier.

**Follow-up:** Can ion exchange polish the effluent from our clarifier, reducing the nickel to trace levels?

**Panelist:** Ion exchange is a viable way to polish the effluent from the clarifier, and there are several commercial units on the market. You must be careful that the resin is not fouled by suspended solids and traces of oil and grease, so you probably need to install a filter/carbon system ahead of the ion exchange. Also, you only need a cation exchange system, if all you want to do is remove nickel.

I agree with the first answer; your best option is to attack the problem at the source first.

**Question:** What is the best option for reclaiming nickel from a stagnant nickel drag-out? It is currently being treated in a metal precipitation system.

**Panelist one:** A large portion of the drag-out should be returnable to the plating tank. The key is to use only deionized water for the drag-out rinse tank, and have an automated system for pumping drag-out rinsewater back to the plating tank, as room allows. If this is insufficient recovery, there are electrolytic systems using inert proprietary anodes that can be used to plate nickel out of a drag-out rinse. You can improve the removal

efficiency, if you can heat up the drag-out rinsewater.

**Panelist two:** Consider your options with cost in mind. The least expensive procedure is to return the rinsewater back to the plating tank as just described. You can then evaluate electrolytic recovery and compare it to the others—RO, evaporation and ion exchange. Ion exchange backwash typically needs to be de-acidified before you return the regenerant stream, so you'll need additional equipment for that. RO can only concentrate to about 20-40 percent of plating strength, so you might need to provide for evaporation equipment to further concentrate the RO rejectate.

**Question:** Is there any way to treat a chemical called 2-ethylhexylphthalate? What could be the source?

**Panelist one:** 2-ethylhexylphthalate may be an additive to electroless nickel or brightener in other plating solutions. Check your MSDS inventory to see which, if any, chemical products contain significant amounts of either this compound or generic "phthalates." You might need to send a letter to all your suppliers, asking if this compound is used in any products you currently purchase from them. You might even have to sample at various points in the plating department to narrow down the use of this compound to a specific processing line. Once you know where it is, you can move to eliminate it.

**Panelist two:** Be sure the laboratory verifies that the compound is actually present. Organics are not that easily identified and quantified, and there have been numerous cases where a laboratory reported something that was present, when in reality it was not

present. You might want to send the lab a spike and a blank (tapwater) to see if they get the right answer.

#### Removing Fluoride

**Question:** How can fluoride be removed from wastewater to obtain a concentration of less than 2 ppm?

**Panelist:** Fluoride is typically removed using lime precipitation, but whether you can get it down to 2 ppm needs to be verified by lab scale testing. Proprietary removal methods are also available, along with ion exchange and an activated alumina process.

#### Soaps, Cleaners & Clarifiers

**Question:** What specific soaps or cleaners interfere with settling in a clarifier?

**Panelist:** Any soap or cleaner will have a detrimental impact on the performance of a typical wastewater treatment system, but there is a big difference in the degree of impact between formulations. You should first evaluate a variety of cleaners for impact on the treatment system, using jar tests in the laboratory. Choose the cleaner that has the least detrimental impact and still does the cleaning job.

**Question:** Are there any methods for treating spent cleaners?

**Panelist one:** As for treating spent cleaners, there is not much new out there. Most cleaners are treated by lowering the pH to under 2 with acid, adding an amount of alum (aluminum sulfate) that is determined in the laboratory, and then raising the pH back up to about neutral before metering the treated cleaner into the waste treatment system.

**Panelist two:** You should also look into technologies available for making cleaners last much longer, reducing treatment requirements. Ultra-filtration, and lipophilic filtration can be investigated. These remove oil and grease, keeping the cleaner in working condition for months or even years.

**Question:** Flow equalization tanks containing aqueous-based cleaners, especially those with hot rinses, tend to be breeding grounds for algae. What is an effective way to control the growth without adding algaecides?

**Panelist:** Any oxidation process such as aeration, treatment with sodium or calcium hypochlorite or peroxide should inhibit algae growth in the tanks.

#### Recovery of Sulfuric Acid

**Question:** What process can be used to recover sulfuric acid from a chromium stripping process?

**Panelist:** There is a process known as acid retardation or acid sorption that may be applicable, but there is a big question of economics here. Sulfuric acid is very cheap, and recovery can not easily be justified. If you are using chromic-sulfuric to strip copper, for example, consider switching to commercially available persulfate strippers that can be returned to the supplier for recycle.

#### Setting Up a New Shop

**Question:** What waste treatment process and recycling techniques would you use in a new facility that will be performing copper, nickel and chrome plating?

**Panelist:** I would strongly advise investigating non-cyanide copper plating processes, and employ evaporative recovery on all three solutions. You would still need to waste-treat for compliance purposes, but I would look at a totally recycled, no-discharge system that would remove your facility from the list of significant dischargers. Alternate recovery options for nickel to investigate include ion exchange and RO. Your waste treatment system would employ microfiltration, carbon filtration and ion exchange to produce water of sufficient quality for recycle to the plating process.

#### Status of F006 Sludge

**Question:** What is the status of delisting F006 sludge so that after stabilization it can be disposed in a landfill such as other metal sludges that are not listed?

**Panelist:** There has been a lot of talk, but not much action about getting F006 delisted, or allowing the generator to determine whether it actually is hazardous via the TCLP test, but not much has happened so far. This is very frustrating, because the industry has data that clearly indicate that the vast majority of sludges produced in waste treatment systems in shops that do not do

cadmium plating would be non-hazardous, if the TCLP test was the determining factor. In the meantime, because it is a listed waste, you must dispose of all F006 waste as hazardous (with a few exceptions such as F006 generated from treating rinsewater from non-cyanide zinc plating on ferrous substrates).

#### Oil Removal

**Question:** Would the panel review low-maintenance, highly effective oil removal techniques that are being utilized on in-line process cleaners where low operator intervention is desired?

**Panelist:** Low-maintenance, highly effective methods for continuously removing oils from a cleaner have been presented at past AESF Week programs. One technique called lipophilic filtration has been tested by one of my clients for more than two years now, and that client is quite positive about the results. The filters are very low in cost, and are capable of removing both free and emulsified oils below 15 ppm in the cleaner, when properly sized and maintained. One supplier of this type of equipment is part of the exhibit here.

#### Hard Water

**Question:** A zinc plating jobshop is in the process of installing a new waste treatment system. Water use will be 75,000 gal/day. The shop would like to reuse the wastewater in some areas of the plating process, but there is a hard water condition that builds a heavy scale and clogs pipes. Is there a cost-effective way to deal with a severe hard water condition after waste treatment?

**Panelist:** Hard water is called that because it contains so high a mineral content (dissolved ions such as calcium, magnesium, sulfate, phosphate, etc.), that the water is basically useless as rinsewater (it already has a lot dissolved in it, so it can't rinse away additional ions brought in). If the water is relatively low in TDS (total dissolved solids)—for example 1500 ppm—then you can probably use it after a cleaner and before an acid rinse. Harder water needs to be demineralized through an ion exchange system, or a combination of RO followed by ion exchange to make it more suitable for re-use. P&SF