

Practical Pollution Prevention Tips From the Wastewater Treatment Operators Forum

The Wastewater Treatment Operators Forum attracted another good turnout at AESF Week 1996. These edited excerpts of discussions between the panelists and audience members reflect some of the current concerns in the surface finishing industry.

Panelists at this year's forum were: Moderator H. Lee Martin, Westinghouse Savannah River Company, Aiken, SC; Dr. Clarence Roy, CEF, Vortex Water Systems, Inc., Stuart, FL; Lyle Kirman, Kinetico Engineered Systems, Newbury, OH; Joelle Hill, Scientific Control Labs, Inc., Chicago, IL; Joe Welch, FT Recovery Industries, Union City, IN; and Patrick Dixon, State Plating Co., Inc., Elwood, IN. Thanks to the panelists for an outstanding program.

Editor's note: Replies to some questions include comments from the panel and the audience.

Information on Resins

Q Resin manufacturers offer all sorts of bells and whistles, but very little information on the exact functioning of their resins. Where can we get this type of information if we want to be able to extract a specification?

A Most of the big resin manufacturers have gotten out of the practice of giving advice.

Comment from the floor: There are some smaller companies, two of which are here at the conference, that welcome such questions and are willing to work with you on specific problems. For specific selectivity for metals, there is some silica-gel-bonded ligand technology now that is very expensive, but also very specific for certain metals. I don't know how well it does under chelating or complexing conditions, but if you want to pull one metal out of a mixed

metal waste stream, the technology exists.

Cyanide Removal

Q There are some companies that are claiming to be able to remove cyanide by ion exchange. Just how do you do the regeneration without using an acid?

A If you are just going to remove cyanide, you have to ask if you're going to remove complexes, such as ferrocyanides or recirculate a cyanide plating bath rinse. My company will not do ion exchange recirculation on cyanide plating bath rinses. It's not that it can't be done, but there is that risk of having cyanide in the cation exchange column when trying to regenerate it with acid, either through equipment failure or operator error. When a dilute cyanide waste stream is going through a cation resin, the pH drops and hydrogen cyanide is formed, but it doesn't come bubbling out as a huge flow of gas, it stays dissolved as hydrogen cyanide. It is present for only a couple of minutes, then it's in an anion exchange column where the pH rises and it comes back out as an anion. So it can be done, but there's always an inherent risk in that type of system.

Q Does it come back out as a cyanide that can't be dumped into the sewer?

A It would have to be treated. If you're planning to recover only the metal, you could do it that way, but there's always the risk. If you're going to remove ferrocyanide complexes, ion exchange can do it, and you can regenerate them with a caustic and send them back for some other kind of treatment. At this point, you don't have any free cyanide—all you have is iron cyanide complexes.

Q Does the EPA realize that ferrocyanides don't break

down, or do they still count that as part of the total cyanide?

A It is total cyanide. They don't care if ferrocyanide is in road salt, table salt or whatever. Cyanide is cyanide as far as EPA is concerned, even though it is more stable than many other compounds.

Cadmium Limits

Q I have a problem with meeting my cadmium limit of 110 ppb. Can anything be done?

A With a good metal hydroxide precipitation system, you should be able to meet 110 ppb for cadmium, but that's assuming you've broken the cadmium complex completely free from cyanide. Even with a good job of precipitation, you may have to go through a polishing operation that would include perhaps a sulfide-type precipitator, or sand filtration or even ion exchange. The level of 110 ppb for cadmium is tight, but it can be done.

Electroless Nickel Waste

Q We have a situation in which electroless nickel solution from a tank, perhaps via a faulty valve, sometimes gets into our waste stream and creates problems. Our waste treatment equipment is not really designed to handle electroless nickel; is there a quick fix for this? Our waste treatment process is continuous hydroxide precipitation with ion exchange polishing, then discharge to the POTW.

A It would depend on what your chelating agent is. If you are lucky, you could throw in some calcium and aluminum, then do jar tests to see if that works.

Reply: If we put in too much calcium, we find that it messes up our resins or binds them down to some extent.

Panelist: One thing you could try right up front is pre-treatment with a sulfide precipitator. If the pH is on the alkaline side, you could hit it with some sodium sulfide—that's a good complex-breaker, but a lot of plants are afraid to use it.

Panelist: It almost sounds as though it's leaks and spills that are getting in there. You should have secondary containment around your electroless nickel tank, because spills and leaks are going to happen.

Metal Recovery

Q We've been operating a nickel recovery unit for nickel chloride and nickel sulfate. One of our problems is that we get algae growth in the collection vessels for the rinsewater, which then goes to nickel transfer stations. The algae get caught in our filters, but the filters have to be cleaned by hand. Is there something that we could put in the transfer stations to kill the algae and eliminate the necessary physical cleaning, yet not impair the effectiveness of the ion exchange recovery units?

A We've seen this in a couple of cases before. The cause was traced to the deionized water storage tanks. The algae were coming down through the system to the rinse tanks, where they started feeding on the brightener and just went crazy. Use of an algicide is recommended, or an ultraviolet light, but don't use anything that would degrade the ion exchange units. Also, keep the water moving.

Q Can magnesium hydroxide be used alone to precipitate zinc, nickel and lead and small amounts of copper? I know that it can go up to a pH of 5.5, so what are the advantages and disadvantages of using it?

A I would not use magnesium hydroxide as the primary precipitant because you can never get the pH high enough to precipitate all the metals.

You can add magnesium hydroxide up front as a pre-treatment, but it takes 45 minutes for anything to happen, and that's the problem with it. It's good for pre-treatment, but don't think you're going to bring the

pH up with it unless you've got all day to do it, because it just isn't going to happen.

Unexplained High Concentrations

Q I have lab results that exceed my discharge limits. This seldom happens and my shop records have never been audited. If I "inadvertently" record a lower concentration on my Discharge Monitor Report, how could that be detected? Is there any reason why I would be checked on that?

A I'd bet there isn't one operator in this Session who hasn't had the very same thing happen. In a phone call I received, the caller reported that he had a reading for lead that was 10 times what he had ever had in the past. He didn't have lead in the plant, didn't even use lead anodes anymore. What should he do? He was only checked twice a year.

It's a Catch-22 situation: If he forgets about that reading, and reports it on his DMR and has never been audited, the chances of being audited, just by that one act, have greatly improved. One poor fellow in Indianapolis did just that. His reading for nickel was four or five ppm and he recorded three ppm on his DMR. A disgruntled employee wrote a letter to the mayor's office, claiming that this plater was the worst polluter in Indiana. A subsequent investigation turned up the lab report, which was on the premises. Now, that's not the only way you can get lab reports. If you use an outside contract laboratory, that laboratory can be subpoenaed and they would have to turn over their results. That particular violation cost the man a \$25,000 fine. There were extenuating circumstances, but that was the only thing they could hang him on. They also fined him \$5,000 because a garden hose had "inadvertently" jumped out of his rinse tank and, by coincidence, landed in the sewer at the same time that the city was monitoring his effluent discharge. He has a piece of that hose hanging in his shop today with a \$5,000 price tag on it.

What I advise a client to do when something like this happens and it's a fluke is this: It's one thing to have a legitimate overage, and if that's the case, and if you do your own in-house testing, it's not too hard to make sure

you don't have any skeletons in the closet. If you use an outside lab, however, as a lot of us do, there's a paper trail that's going to be hard to get rid of, so in this case you want to resample. You want to resample and document the fact that you had a bad sample, and that the second and third samples turned out good and that the bottle was possibly contaminated, or something you can't explain, but at least you've got a rationale for a defense and why you put those numbers down. It wasn't that you deliberately lied about it. I would think long and hard about omitting data or turning in data that I knew were false.

Right now, the EPA has a new program out, called "Bad Guys." This is a statistical method by which they can take the DMR data that's in their records and analyze it. Normally, it's a bell-shaped curve, but what the program looks for is a negative skew. It also looks for the case in which you may have moved over-limit data down to the limit. On a probability-of-occurrence basis, the program looks for a single number that has been reported over and over again without change and flags it. The EPA has plans to use this program nationwide, so scan your own DMR and plot it, because somebody is going to be looking at what you've already reported. Be aware there are many temptations for employees to report the "right" numbers, so be in a position to correct a problem or have a good technical explanation, because if you look unusual, someone will be coming for a harder look.

Phenol & Acetone Treatment

Q What is a cost-effective method to treat less than five ppm of phenol or acetone in the water?

A Acetone is really tough unless you air-strip it. With phenols, there are a lot of options. You can destroy them by alkaline chlorination or permanganate oxidation. They can also be removed and concentrated by synthetic absorbents, not ion exchange resins, as such, but something similar to ion exchange that has humongous capacity for phenols and can get them out. But the acetone is very tough if it's in the water. It's going to go through carbon and through just about everything. P&SF