

ZINC IN FLOOR WAX FOUND TO CAUSE WASTEWATER DISCHARGE VIOLATIONS

For more than one year, wastewater discharged from Beckman Instruments, Inc. in Palo Alto, sporadically exceeded wastewater discharge limits for zinc. In twelve of the 89 wastewater samples taken over the year-long period, zinc concentrations ranged from 2.1 to 15.3 milligrams per liter (mg/l), exceeding the local discharge limit of 2.0 mg/l. A 1994 compliance agreement between the Regional Water Quality Control Plant and Beckman Instruments included requirements to do the following:

- ◆ conduct a source investigation to identify the zinc source;
- ◆ prepare a case study of the zinc problem and its solution; and
- ◆ share the company's findings with others through organizations such as the local Chambers of Commerce and the Santa Clara County Manufacturing Group.

Through its investigation, Beckman found that a commercial floor wax and floor wax refreshers (buffers) were the source of its zinc violations. The identified floor care products contained zinc in concentrations ranging from 2% to less than 1%. One difficulty Beckman found was that the presence of zinc was not listed on Material Safety Data Sheets (MSDSs) for any of these janitorial chemicals. As a result of the investigation, Beckman switched to zinc-free floor care products. Now that Beckman has eliminated the use of zinc-containing floor care products, Beckman expects to achieve compliance with wastewater discharge standards for zinc once zinc-containing wax residues are eliminated from building floors and site wastewater drain lines.

A copy of the case study prepared by Beckman staff is on the reverse. Beckman's efforts to share its experience with the local business community through distribution of the case study and presentation to business groups have proven valuable for local businesses and the environment. Because Beckman shared its story, at least one other facility has improved its compliance through eliminating use of zinc containing floor waxes.

Our Search for Zinc Contamination in Industrial Wastewater submitted

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For a period of - 18 months, Beckman Instruments, Inc., Palo Alto site, experienced sporadic zinc excursions (twelve of eighty-nine samples analyzed) in wastewater from two of our three wastewater sampling points. The wastewater collected at these sampling points represents commingled industrial wastewater and domestic sewage. The excursions ranged from a low of 2.1 mg/L to a high of 15.3 mg/L. (Palo Alto's discharge limit is 2.0 mg/L.) Locating the source of zinc in our wastewater was time consuming, frustrating, costly and a lot like looking for the needle in the hay stack. Our approach to resolving the problem involved a thorough, methodological approach. A synopsis of our investigation methods follows.

We began the investigation process looking at the obvious--our chemical inventory and the waste streams resulting from our manufacturing processes for zinc containing compounds. We quickly eliminated process waste water as a source. We also evaluated the use of the zinc containing materials in inventory and verified that none were used in a manner which would contact waste water sources. Next we eliminated paintbrush cleaning and similar facility related projects as none had occurred during the time of the excursions.

As the investigation moved toward the less obvious, we identified non-process wastewater streams and the plumbing feeding the two sampling points. The only sources in common between the two points were lavatories and janitor's closets. We collected and analyzed water from HVAC condensate, steam autoclave effluent, etc., which is piped into the drains in the janitor's closets to no avail. The focus of our investigation then turned to the commercial custodial chemicals and their usage in our facilities.

Our custodial services are out-sourced to a commercial industrial cleaning firm. We first conducted an inventory of the materials they store in the janitor's closets and on their carts. Once the listing was verified complete by the contractor, current Material Safety Data Sheets (MSDSS) for each material were obtained and evaluated for zinc (or zinc containing material) in the product formulations. None of the MSDSS listed zinc as a component.

Two of the materials, toilet bowl and shower tile cleaners, were low pH (both contained phosphoric acid). We evaluated their use to ascertain if these materials were causing metals to be stripped from pipes and other metal fixtures. Based on that evaluation, we eliminated acid degradation as a cause. We also analyzed these materials for zinc content. Neither exceeded 2 mg/L, although the tile cleaner was close at 1.89.

Because we found measurable zinc approaching the discharge limit in one of the cleaners and zinc was not listed in the product formulation, we decided not to rely solely on the information on the MSDSS. Each manufacturer was contacted for additional information regarding zinc in their product formulations. The manufacturers of the commercial floor

waxes and refreshers (buffers) stated that all of the products contained zinc. (One contained 2% zinc while the other three contained less than 1 %.) The manufacturers also indicated they had zinc-free formulations.

Having discovered a potential source for the zinc, we had our contractor strip all the waxed floors (saving the wastewater produced, which we disposed of it as a non-RCRA hazardous waste) and re-wax with the non-zinc containing formulations. Samples of mop bucket water during the stripping process were up to 350mg/L and after the project were less than 2 mg/L.

We developed a list of cleaning materials (by brand name) the contract custodial service is approved to use in our facilities. Purchasing amended their contract to include using only Beckman approved materials as one of the contract conditions. In addition, Facilities had the contractor install an automatic cleaning agent mixing station so cleaning materials are pre-measured to the appropriate strength. Finally, we continue to audit their closets and carts to verify that they are using only Beckman approved cleaning materials.

Since the discovery that the use of certain floor waxes and finishers can result in zinc concentrations greater than our discharge limit of 2 mg/L, I have advised many of my Bay Area colleagues of our experience. One of them investigated the materials used by her company's contract custodial service and found their waxes and floor finishers (different contractor and different manufacturers) also contained zinc (in the range of 3000-6000 mg/L). She has since worked with her facilities department to have their service convert to non-zinc formulations. I would encourage you too evaluate this potential source of heavy metals in waste water and to eliminate it if present.