INDUSTRIAL PROCESSES TO REDUCE GENERATION OF HAZARDOUS WASTE AT DOD FACILITIES

PHASE I REPORT
EVALUATION OF 40 CASE STUDIES

prepared for the

DOD ENVIRONMENTAL LEADERSHIP PROJECT OFFICE
Washington, D.C.

and

U.S. ARMY CORPS OF ENGINEERS
Huntsville, Alabama

contract

DAC A87-84-C-0076

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February 1985

facilities to plate thick-walled cannon parts for field ordinance and ship guns. It is one of the few cannon manufacturing facilities in the non-Communist world.

Four huge plating lines, installed by NAPCO of Terryville, Connecticut, are used to plate chromium, cadmium and copper, and for anodizing and phosphating. Plating is applied for corrosion protection and to increase wear resistance under battlefield conditions.

Approximately 27 percent of plating drag-out was recovered from the rinsewater. Rinsewater flow was conductivity controlled. Rinsewater effluent was pumped to evaporators in which it was concentrated then returned to the plating tanks.

The production of wastewater from the plating facility was estimated to be 61,500 gpd in 1982 (17). This waste was treated in an industrial waste treatment plant and directly discharged to a river. Concentrated solutions were batch treated or bled into the system for treatment.

Most of the information used in this review was obtained from a recent journal article about the facility (20). Additional information will be gathered during Phase 2.

→ 5.4.11 Rinse and Bath Changes at Mare Island NSY. Case No. 31

Mare Island NSY operates a plating shop, in which ship and submarine parts, equipment, hardware and circuit boards are plated. The principal metals plated are cadmium, silver, chromium, nickel and copper, with lesser amounts of tin, gold, and lead. Plating is carried out with 65 process tanks and 15 rinse tanks.

At Mare Island NSY, plating related hazardous waste has been reduced by the use of controlled flow rinsing, and by maintaining plating bath chemistry to reduce the frequency of plating bath dumps. A total of 81,000 gpd of water was being used in the plating shop. Wastewater was reduced to about 60,000 gpd by manual control of rinsewater flow. No special rinse modifications have been used. Two counter-flow rinse tanks are a part of a special project, but they are not often used.

Approximately half of the waste flow from the plating shop consists of drainage from scrubbers on the acid and chromium exhaust ventilation systems. Problems have developed due to poor maintenance on these scrubbers resulting in them running dry. When placed back in service, the resulting high concentrations of chromium exceeded the capacity of the industrial treatment plant (50 ppm of chromium).

There is little motivation to reduce the waste discharge from the plating shop, since the industrial wastewater treatment plant was sized to handle the flow presently being produced. In fact, there is a concern that a reduction in flow might adversely affect the treatment plant operation by reducing the dilution of more concentrated wastes. The treatment plant produces about 300 cubic yards of hazardous sludge per year, approximately 60 percent of it the result of treating waste from the plating shop.

Plating baths are monitored by the chemistry department and maintained such that they last at least 3 years between dumping. When they are no longer serviceable, they are hauled offsite and disposed of by a contractor.

5.4.12 Water Layer Over Methylene Chloride on Tanks at Various NARF's Case No. 32

One proposed modification was to place a water layer on top of methylene chloride tanks to reduce drag-out at NARF plating shops. The individual who submitted this modification for study is no longer associated with the Navy department from which this recommendation was submitted. None of the personnel at NARF plating shops solicited were familiar with this modification. It is therefore recommended that further evaluation of this case be discontinued.

5.4.13 Ion Vapor Deposition of Aluminum to Replace Cadmium Plating at Pensacola and North Island NARF's Case No. 33

Corrosion resistance can be provided for steel parts by three methods: cadmium can be plated on the basis metal using wet plating baths; cadmium can be plated using vacuum deposition; or aluminum can be plated by Ion Vapor Deposition (IVD). Of the three methods, IVD of aluminum appears to be the most environmentally safe.

At Pensacola NARF, the first two systems are utilized to plate cadmium on steel parts. Electroplating is from a conventional cadmium cyanide bath. Vacuum deposition of cadmium is performed using a "VaccuCad" system. Plating is done inside an air-tight 2-1/2-foot diameter by 5-foot chamber, located in a vertical laminar flow clean room. Condensed cadmium vapor is filtered from the airstream prior to venting to the atmosphere. The filters are rinsed prior to disposal. Plating using this system is limited to small parts, due to the size of the chamber.

Personnel at the Pensacola NARF would like to switch to Ion Vapor Deposition of aluminum and thus eliminate the environmental problems associated with cadmium and cyanide.