

US EPA ARCHIVE DOCUMENT

PROJECT 4.1.B -WATER REUSE RESIN

Waste Source Electroplaters, metal finishers, and other industries use large volumes of water to wash and rinse materials during the manufacturing process. This high use of water puts an unnecessary burden on water supply and wastewater treatment resources. For this type of service, there is no typical generator. It could include any industry that generates heavy metal contaminated wastewater. However, the average generation rate per customer is about 1,100 gallons of resin per year.

Typical Treatment In most manufacturing processes today; wash and rinse water is used once, then discarded. This "single-use" waste water is directed to an on-site waste water treatment plant where it is treated to levels required by the CWA prior to discharge to a POTW or surface waters. This single-use of water is very wasteful. A great amount of effort and cost is expended to produce potable water for this single use. Additional costs are incurred in treating these lightly contaminated wastewaters prior to discharge.

Current Disincentives to Implement Water Reuse System To minimize water use, a water treatment system that utilizes an ion exchange resin can be installed. One gallon of resin can treat anywhere from 500 to 2,000 (average 1,000) gallons of rinse. Because of RCRA's "derived from rule", most metal finishing and electroplating operations, water reuse systems generate a listed hazardous waste (F006). This, even though there is only a negligible hazard. As above, this moves a company from the CWA to RCRA, with the corresponding regulatory obligations, i.e. paperwork and reporting burden, as well as hazardous waste storage and transportation requirements.

Resin Regeneration Process at USFRS Three types of ion exchange resins are used to provide systems which allow water to be reused. Cation resin removes positively charged ions, such as copper, nickel and zinc, from rinse water and replaces these ions with hydrogen ions. Anion resin removes negatively charged ions, such as chromate, sulfate, and nitrate, from rinse water and replaces these ions with hydroxide ions. The third resin type is called a mixed bed resin and contains a mixture of both cation and anion resins. Mixed bed resin is most often used in water reuse applications

because it totally deionizes the water, removing all cations and anions and producing highly purified water.

The regeneration process is essentially a reverse of the loading process. Contaminant ions are removed from the resins using hydrochloric acid and sodium hydroxide solutions.

Mixed bed resins are first separated from each other before regeneration. Cation resin is placed into a tall column. The first step of regenerating is to backwash the resin by flowing water up into the resin from below. The resin beads fluidize, allowing debris and other adhering dirt to be washed off the resin. The next step is to flow a hydrochloric acid solution through the resin. This process strips metals and other cations from the resin and replaces them with hydrogen ions. The final step is flowing water through the resin to remove excess acid. Anion resin is regenerated in the same manner except that sodium hydroxide is used to strip the anions from the resin, leaving hydroxide ion on the resin.

The chemicals used by USFRS in the regeneration process are further recovered as follows:

1. The recovered acid is sold either to a user or used over again by USFRS in the resin regeneration process;
2. Hydroxide is recovered and used for neutralization of acid metal wastes received at USFRS; *and*
3. The metal hydroxide sludge's produced in this process are recovered for reuse by a secondary metals recovery company.

Projected Benefits. In 1997, USFRS recycled 46,000 gallons of mixed bed resin. By evaluating the potential market, the cost effectiveness of water reuse, and the incentives offered by the XL Project, USFRS has projected an increase in the volume of Ion exchange units that will likely be placed in service through this project. It is projected that this project will result in an increase of 202,000 gallons of resin used over the three years of the Project. With an estimated average of 1,000 gallons of water being treated per gallon of resin used, this would reduce the need for potable water and the discharge to the POTW by 202 million gallons each. A more detailed discussion of benefits is located in Appendix D.

4.1.X. General Project Qualifications

For a waste to qualify for the USFRS Project XL, it must satisfy all the following requirements:

- 1) The material has a current, definable, regulatory barrier to its legitimate recycling or reuse.
- 2) The material must have a value or use as a feedstock or recyclable material for the generation of a salable or useable product that replaces a current commercial product.
- 3) The material must be able to be handled, treated and processed at USFRS.

4.2 Regulatory Resource

In addition to the environmental benefits provided by this project, USFRS will also assist with the development of an outreach program which will serve as a technical and or regulatory resource for the target industries. The focus will be in the metal finishing sector. This is one of US EPA's targeted industries for the reinvention of environmental regulation and is currently participating in the Common Sense Initiative. According to the MPCA's records, this sector also makes up the largest portion of large quantity generators in Minnesota. USFRS is currently planning to work with the Minnesota Metal Finisher Association in developing a self-audit program which will include a self-audit book and periodic participation in actual 3rd party audits. This will be used to assist participants with regulatory compliance requirements. It will also include P2 where appropriate. USFRS projects that this self-audit form will be useful for approximately 360 Minnesota companies.

5.0 XL Participant Approvals

Appendix B includes a copy of the participant agreement form to be used as part of this project. This will require the signature of the customer and USFRS. The MPCA and appropriate counties responsible for RCRA compliance of the participants will receive copies of this agreement. This contract includes:

- Description of all XL requirements.

- Identifies all responsible parties.
- Identifies all wastes that are a part of this project.

Prior to inclusion into this project, USFRS will provide each of the appropriate regulatory agencies the opportunity to reject a company or its particular waste stream from participation in this project. The agencies involved would include: US EPA, MPCA, MCES, Ramsey County, and the county agency of participating customers.

This would be done by issuing a letter to the designated agency contact listing the company and waste streams. If one of the agencies vetoes their participation, the company will be dropped from consideration. If additional factors come to light at a later date, the agencies will have the authority to remove that facility from the project. A letter requesting the company's removal would be sufficient.

6.0 Monitoring/Record Keeping/ Accounting

To track XL Project Materials, USFRS will use a special bill of lading that contains comparable information held on the Uniform Minnesota Hazardous Waste Manifest. A copy of this bill of lading will be provided for agency approval prior to use.

Including the parameters used to determine the success of this project, all information normally required on a biannual hazardous waste report will also be collected. This will be provided to the agencies on a to-be-determined schedule.

USFRS will maintain records from this project for the length of its XL permit and, at a minimum three (3) years

7.0 Stakeholder Involvement

As of October 9, 1998 USFRS had conducted 6 Project XL Stakeholder meetings. These have been held at both public buildings and at the USFRS facility. This has allowed participants an opportunity to tour our operations, as well as, meet at local neutral sites. Statements of Substantial Consensus

from the participating Stakeholders are attached to the submittal cover letter to US EPA.

A list of the participants and a description of the Stakeholder Involvement Plan is attached as Appendix C. Please contact the following for a copy:

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8.0 Permit Duration

The XL Permit is intended to remain in effect for 5 years. As well as having the authority to discontinue this project, the MPCA or USFRS also have the option of extending this project if appropriate. This project will be reviewed at the 4-year mark to determine if this project has been a success. Project extension or termination will be evaluated at that time.