GRAY DAVIS, GOVERNOR

OFFICE OF ADMINISTRATIVE LAW

California Regulatory Notice Register

REGISTER 2002, NO. 29-Z PUBLISHED WEEKLY BY THE OFFICE OF ADMINISTRATIVE LAW JULY 19, 2002

PROPOSED ACTION ON REGULATIONS

GENERAL PUBLIC INTEREST

(Continued on next page)

Time-Dated Material

PROPOSITION 65

RULEMAKING PETITION DECISIONS

SUMMARY OF REGULATORY ACTIONS

ADDENDUM TO 2002 RULEMAKING CALENDAR

The *California Regulatory Notice Register* is an official state publication of the Office of Administrative Law containing notices of proposed regulatory actions by state regulatory agencies to adopt, amend or repeal regulations contained in the California Code of Regulations. The effective period of a notice of proposed regulatory action by a state agency in the *California Regulatory Notice Register* shall not exceed one year [Government Code § 11346.4(b)]. It is suggested, therefore, that issues of the *California Regulatory Notice Register* be retained for a minimum of 18 months.

CALIFORNIA REGULATORY NOTICE REGISTER (ISSN 1041-2654) is published weekly by the Office of Administrative Law, 300 Capitol Mall, Suite 1250, Sacramento, CA 95814-4339. The Register is printed by the Office of State Publishing and is offered by subscription for $302.00 (annual price). To order, call (916) 445-5391. Periodicals postage paid at Sacramento, CA and additional mailing offices. **POSTMASTER:** Send address changes to the: CALIFORNIA REGULATORY NOTICE REGISTER, Customer Coordinator, Office of State Publishing, 344 N. 7th Street, Room 104, Sacramento, CA 95814-0212.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Final Decision to Certify Hazardous Waste Environmental Technology

The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) has reached a final decision to certify the following company's hazardous waste environmental technology:

Applicant: Hydromatix Corporation
10450 Pioneer Boulevard, Building 3
Santa Fe Springs, California 90670

Technology: Hydromatix 786E Ion Exchange Rinsewater Recycling System

Section 25200.1.5 of the Health and Safety Code enacted by Assembly Bill 2060 (1993) authorizes DTSC to certify the performance of hazardous waste environmental technologies. The purpose of the certification program is to provide an in-depth, independent review of technologies to facilitate regulatory and end-user acceptance. Only technologies that are determined to not pose a significant potential hazard to the public health and safety or to the environment when used under specified operating conditions may be certified.

DTSC makes no express or implied warranties as to the performance of the manufacturer's product or equipment. The end-user is solely responsible for complying with the applicable federal, state, and local regulatory requirements. Certification does not limit DTSC's authority to take any action necessary for protection of public health and the environment.

By accepting certification, the manufacturer assumes, for the duration of certification, responsibility for maintaining the quality of the manufactured equipment and materials at a level equal to or better than was provided to obtain certification and agrees to be subject to quality monitoring by DTSC as required by the statute under which certification is granted.

DTSC's proposed decision to certify was published on June 7, 2002 in the California Regulatory Notice Register 2002, Volume No. 23-Z, pages 1068–1072. No comments were received during the 30-day public review and comment period. DTSC's final certification shall become effective on August 19, 2002.

Additional information supporting DTSC's decision can be found in the January 2002 Cal/EPA report entitled *Environmental Technology Verification Report Hydromatix 786E Ion Exchange Rinsewater Recycling System*. To obtain a copy of the report contact:

California Environmental Protection Agency
Department of Toxic Substances Control
Office of Pollution Prevention and
Technology Development
P.O. Box 806
1001 I Street, 12th Floor
Sacramento, California 95812-0806
Attn.: Mr. Edward Benelli (916) 445-2959

A description of the technology to be certified, the proposed certification statement, and the certification conditions and limitations for the technology of the company listed above follows.

CERTIFICATION PROGRAM (AB 2060)
FOR HAZARDOUS WASTE
ENVIRONMENTAL TECHNOLOGIES

FINAL NOTICE OF
TECHNOLOGY CERTIFICATION
Hydromatix 786E Ion Exchange
Rinsewater Recycling System

Technology: Hydromatix 786E Ion Exchange Rinsewater Recycling System

Manufacturer: Hydromatix Corporation
10450 Pioneer Boulevard Building 3
Santa Fe Springs, California 90670

Background

Metal Products and Machinery (MP&M) industries generate rinse wastewaters containing metals and their salts during electroplating, etching, anodizing, and stripping operations. Rinse wastewaters originating from MP&M industries often characterize as hazardous wastes due to their toxicity and corrosivity.

One method of treating MP&M rinse wastewaters uses ion exchange resins to remove both the metals and their salts, yielding a product deionized (DI) water that can be reused in rinsing operations. The metals and their salts are removed in separate columns which contain the cationic and anionic exchange resins. Ultimately, the ion exchange capacity is exhausted, and the resins must be regenerated by removing the accumulated cations and anions.

Hydromatix Corporation (Santa Fe Springs, California) developed its 786E Ion Exchange Rinsewater Recycling System to remove metals and their salts from rinse wastewaters generated by MP&M industries.

Technology Description

Background

The Hydromatix 786E system features packed bed, counter-current ion exchange columns with conductivity meters, programmable logic controllers (PLC), and automatic valves to manage the treatment and regeneration processes. The 786E system uses two

pairs of cation and anion exchange columns to enable continuous operation; one pair operates while the other is being regenerated or is in standby. The cation exchange resin is regenerated by acidic solution, and the anion exchange resin is regenerated by basic solution.

Regenerant wastewater is formed when the acidic and basic solutions are discarded at the conclusion of the regeneration cycle. The regenerant wastewater comprises a smaller, more concentrated volume than the original rinse wastewater treated. The Hydromatix system reduces the volume of regenerant wastewater by recycling portions of the water rinses used in regeneration. Portions of the water rinses used in regeneration are re-used as make-up solutions for the next regeneration cycle, and other water rinses are returned to the feed tank rather than wasted. Raw chemical usage is also minimized by reusing portions of the acid and base regenerant solutions.

Treatment

Contaminants such as oils, grease, and oxidizing agents are kept out of the rinse wastewater entering the 786E system by segregating the various wastestreams generated from plating operations, and by passing the rinse wastewater through a carbon filter to remove any organic compounds that may be present.

The 786E system uses Purolite (PuroliteUSA, Bala Cynwyd, Pennsylvania) PFC-100 H strong acid cationic exchange resin, which features a sulfonic acid functional group with a total exchange capacity of 1.9 equivalents per liter (eq/L). The anionic exchange resin used is Purolite PFA-300 OH strong base type II, featuring a quaternary ammonium functional group, with a total exchange capacity of 1.4 eq/L.

DI water production continues until the resin capacity is exceeded; a conductivity sensor detects the ionic contamination resulting from resin exhaustion. The volume of rinse wastewater treated per run is dependant on the concentration of metals and their salts in the rinse wastewater with higher concentrations resulting in earlier exhaustion of the resin material.

Regeneration

The 786E system performs regeneration cycles for the cation column first, followed by regeneration of the anion column. The system uses upflow service, and downflow regeneration, in a counter-current flow system. High quality product DI water is obtained in counter-current flow systems because the treated water passes through the most highly regenerated portion of the resin bed immediately before it exits the column.

Evaluation Approach

The Hydromatix 786E system evaluation required measurements of treatment volumes, generated wastes, a calculation of a mass balance, and a determination of the regenerated resin capacity. Hydromatix 786E system diagrams and documents were reviewed to determine the placement of monitoring and sampling equipment. Aero-Electric Connectors, Incorporated (AEC, Torrance, California) was selected to be the host facility for the 786E system evaluation. Five test runs lasting approximately one week each were conducted over a three month period at AEC.

DTSC personnel specified and supervised the installation of monitoring and sampling equipment on the Hydromatix 786E system at AEC. The monitoring equipment allowed flow monitoring of the feed rinse wastewater, product DI water, regenerant solutions, and regenerant wastewater during actual production operations. The sampling equipment allowed for sample collection from the feed rinse wastewater, product DI water, and regenerant waste streams.

Arrangements were made to have independent chemical analysis of the samples collected from the 786E system at AEC. An ion exchange resin sampling method was devised, and arrangements were made for analysis at the manufacturer's laboratory to determine the resin capacities used and restored. Provisions for quality control and data evaluation were implemented. Data compilation and evaluation methods were developed, and a peer review team was established.

Basis for Certification

Results of Verification Activities

The *Environmental Technology Verification Report* documented the Hydromatix 786E Ion Exchange Rinsewater Recycling System evaluation by DTSC at Aero-Electric Connectors in Spring 2001. DTSC was able to determine the regenerant waste specific volume and cation and anion exchange capacities. Secondary objectives including the collection of information for potential end-users and metal reclaimers, and observing worker health and safety conditions during normal operation of the system, were also achieved. All data resulting from the verification activities was submitted to a peer review team. The collected data and supporting information were sufficient to verify the technology and issue the certification statement.

Regenerant Waste Volume Produced

The regenerant waste volume produced was measured with inline flow sensors and totalizers during each test run. The cationic regenerant waste produced averaged 302 gallons (gal) for 18 cubic feet (ft^3) of resin, yielding a specific volume of 16.8 ± 0.2 gal/ft^3. The anionic regenerant waste produced averaged 313 gal for 18 ft^3 of resin, yielding a specific volume of 17.4 ± 0.1 gal/ft^3. Therefore, the regenerant waste volumes produced averaged 17.1 ± 0.2 gal/ft^3 resin.

Cation and Anion Exchange Capacities Restored

Direct sampling of the cation and anion resins was used to determine the exchange capacities restored during regeneration and the total exchange capacities remaining. Cation and anion capacities restored were 94.5 ± 6.8 and 88.7 ± 1.7 percent over five test runs, respectively. Compared to new resin material, the remaining cationic resin capacity averaged 96.0 ± 2.1 percent, and the remaining anionic resin capacity averaged 79.9 ± 1.8 percent. For the cation resin, the resin utilization was found to be 46.6 ± 4.6 percent using three test runs, and the regenerant efficiency was 29.9 ± 28.8 percent using two test runs. For the anion resin, the resin utilization was found to be 57.2 ± 36.5 percent over two test runs, while the regenerant efficiency was 32.0 ± 3.7 percent using two test runs.

Rinse Wastewater Volume Treated

The volume of rinse wastewater treated was measured with an inline flow sensor and totalizer. Based in the five test runs, the rinse wastewater volume treated averaged 75,565 ± 9,663 gallons. The first three runs were each approximately 66,100 gallons; the last two just under 90,000 gallons.

Masses of Acid and Base Consumed

The masses and volumes of acid and base used per regeneration were determined by measuring the volumes of acid and base solutions applied to the columns during each test run. These volumes were combined with analysis of those solutions for concentration to determine the masses used. The flows from the acid and base tanks were measured with an inline flow sensor and recording totalizer. Each of the five values for acid and base regenerant volumes recorded at AEC were usable. The acid volume averaged 271 ± 11.6 gallons, ranging from 260 to 299. The base volume averaged 274.4 ± 6.5 gallons, with a range of 260 to 281. The mass was calculated using the average of the five volumes recorded, and the two concentrations which were acceptable, those from runs four and five. The average for acid volume of 271 gallons and concentration of 87,500 mg/L as $CaCO_3$ yielded a mass of 144.3 lbs HCl which corresponds to 38.9 gallons of concentrated HCl solution (37 percent weight to volume, w/v). Thus, each regeneration cycle for the cationic column was found to require slightly less than 40 gallons of concentrated HCl. As described above, a portion of the acidic regenerant solution was reused from the previous regeneration cycle, but that fraction was not determined in this study.

Each of the volume measurements, and each of the quality assurance (QA) samples associated with the base regenerant study were usable, therefore the reported data is an average of all five test runs. The average base regenerant used was 274.4 ± 6.5 gallons. The average base concentration was 65,400 mg/L as $CaCO_3$, which yields an average mass of 119.7 pounds NaOH. This corresponds to 18.7 gallons of concentrated NaOH solution (50 percent w/v) used per anionic column regeneration. As with the acidic regenerant, a portion of the basic regenerant solution was reused from the previous regeneration cycle, but that fraction was not determined in this study.

Masses of Metal Species in the Regenerant Waste

The concentrations of cations in the regenerant waste were determined for mass balance calculations and to provide information for potential end-users and metal reclaimers. The concentrations were used with regenerant waste volume measurements to calculate the masses of metal species in the regenerant waste. The average and range for the masses of the representative metal species copper, nickel, and zinc were determined.

Each of the five test runs provided usable concentration data for metals, and all but test run two yielded usable data for waste volumes. The average masses and ranges were found to be 113.8 ± 89.7 g and 24.9 to 272.5 g for copper, 175.3 ± 70.5 g and 47.5 to 227.9 g for nickel, and 580.8 ± 411.5 g and 65.6 to 1,078.7 g for zinc.

Product DI Water Quality

As measured by ATL, the electrical conductivity (EC) of the DI water averaged 36 microSiemens per centimeter (µS/cm) at the end of a run, with extreme values of 13 and 78 µS/cm noted. The EC values reported on the control panel often exceeded 100 µS/cm at the end of a run. Other water quality indicators measured included pH averaging 4.5, TDS averaging 36 mg/L, and non-detectable alkalinity.

Worker Health and Safety

Onsite observations at AEC, end-user interviews, and reviews of Hydromatix documentation were used to assess the risks posed to worker health and safety posed by the 786E system. These observations and inquiries indicate that accidental releases due to the failure of piping, valves, or pumps, appear to be unlikely. Routine contact with the system should not result in worker exposure because the waste and regeneration solutions are entirely contained within sealed pipes. Routine maintenance operations such as filter cartridge removal and acid and base concentrate replenishment may involve contact with hazardous solutions and could therefore pose a risk. Non-routine operations such as resin and carbon change-outs would similarly involve hazardous conditions. However, the risk from exposure can be minimized by operators following established operating procedures including adherence to an adequate health and safety plan.

End-User Data Collection

DTSC staff had contacted several Hydromatix end-users and conducted phone surveys. Questions on the following subjects were asked: system information, process information, volume of regenerant, waste generation/management, system performance, reliability, and user health and safety. The purpose of the phone surveys was to provide supportive information to the evaluation of this technology and to develop a database of information from which to select end-users for on-site visits. Three end-user questionnaires were ultimately completed.

Certification Statement

Under the authority of Health and Safety Code section 25200.1.5, the Hydromatix 786E Ion Exchange Rinsewater Recycling System is hereby certified as a pollution prevention technology subject to the specific conditions including the limitations/disclaimer set forth below. The Hydromatix 786E Ion Exchange System is capable of treating MP&M wastewaters within the following performance parameters:

Performance results of the Hydromatix System are as follows (all data calculated at the 90 percent confidence level):

Regenerant waste specific volume: 17.1 ± 0.2 gallons of waste per cubic foot of resin (gal/ft^3). The cationic regenerant waste produced during four test runs averaged 302 gallons for 18 ft^3 of resin, yielding a specific volume of 16.8 ± 0.2 (gal/ft^3). The anionic regenerant waste produced during five test runs averaged 313 gallons for 18 ft^3 of resin, yielding a specific volume of 17.4 ± 0.1 gal/ft^3.

Cation and anion exchange capacities restored: Cation and anion capacities restored were 94.5 ± 6.8 and 88.7 ± 1.7 percent over five test runs, respectively. Compared to new resin material, the remaining cationic resin capacity averaged 96.0 ± 2.1 percent, and the remaining anionic resin capacity averaged 79.9 ± 1.8 percent. For the cation resin, the resin utilization was found to be 46.6 ± 4.6 percent using three test runs, and the regenerant efficiency was 29.9 ± 28.8 percent using two test runs. For the anion resin, the resin utilization was found to be 57.2 ± 36.5 percent over two test runs, while the regenerant efficiency was 32.0 ± 3.7 percent using two test runs.

Rinse wastewater volume treated: 75,565 ± 9,663 gallons average, measured over five test runs, containing typical cations and anions found in plating shop wastestreams.

Masses of acid and base consumed: 144.3 pounds of HCl measured over two test runs, and 119.7 pounds of NaOH per regeneration cycle measured over five test runs. The regenerant solution volumes were 271 ± 11.6 gallons of acid, and 274.4 ± 6.5 gallons of base, each measured over five test runs. The volumes of concentrated acid and base in the regenerant solution volumes were 38.9 gallons of 37 percent HCl, and 18.7 gallons of 50 percent NaOH.

The masses of metal species in the regenerant waste: The average masses and ranges of representative metal species were found to be: 113.8 ± 89.7 g with a range of 24.9 to 272.5 g for copper, 175.3 ± 70.5 g and 47.5 to 227.9 g for nickel, and 580.8 ± 411.5 g and 65.6 to 1,078.7 g for zinc. Metal species were determined using four test runs.

Limitations of Certification

DTSC makes no express or implied warranties as to the performance of the Hydromatix 786E Ion Exchange Rinsewater Recycling System. Nor does DTSC warrant that the Hydromatix System is free from any defects in workmanship or materials caused by negligence, misuse, accident or other causes. However, DTSC believes that the Hydromatix 786E Ion Exchange Rinsewater Recycling System can be used in accordance with the conditions specified in this certification notice to achieve the results specified herein.

Use of the certified technology is limited to the ion exchange treatment of waste rinsewaters as tested. Use of the certified technology must comply with the conditions in the following section.

Specific Conditions

This certification is limited to use of the Hydromatix 786E System for treatment of waste rinsewater of similar composition to that tested as follows:

1. Wastewater stream of similar composition and concentration to the ranges experienced during the tests;
2. Cationic and anionic resin beds of equal or greater volume, and comprised of Purolite PFC-100 H and PFA-300 OH ion exchange resins, as experienced during the tests;
3. Flow rates to columns of the ranges experienced during the tests;
4. Regeneration cycle: regenerant chemicals used shall be the same as those experienced during the tests.
5. Acid and base regenerant concentrations, flow rates, and volumes in the ranges of those used in the tests.

This certification is also limited to use of the Hydromatix 786E System under the following conditions:

6. Compliance with Worker Health and Safety Laws. Operation of the Hydromatix system must be in compliance with all federal, state and local regulations relating to the protection of worker health and safety. In California these include, but are not limited to, Cal-OSHA and OSHA requirements.
7. Personnel Training. Operators with chemical wastewater treatment knowledge and proper training are required to use this technology. Training includes safe operation and maintenance of the various components of the Hydromatix 786E Ion Exchange Rinsewater Recycling System, e.g. control panel and system operation, and equipment including valves, pumps, piping, tanks for rinsewater, regenerant waste, and acid and base solutions.
8. Compliance with Applicable Federal, State, Local Regulations. The user shall comply with all applicable federal, state, and local regulatory requirements.
9. Modifications and Amendments at the Request of the Applicant. Modifications and amendments to this certification may be requested by the applicant and will be subject to approval by DTSC.
10. Certification Reference. The holder of a valid hazardous waste environmental technology certification is authorized to use the certification seal (California Registered Service Mark Number 046720) and shall cite the certification number and date of issuance in conjunction with the certification seal whenever it is used. When providing information on the certification to the user of the technology or another interested party, the holder of a hazardous waste environmental technology certification shall at a minimum provide the full text of the final certification decision as published in the California Regulatory Notice Register.
11. The user of the certified technology shall maintain adequate records to document compliance with the conditions of certification. The records shall be maintained onsite and available for inspection.

Regulatory Implications

This certification is for the specific claims, conditions, and limitations outlined in this notice, and is based on DTSC's evaluation of the technology's performance. The certification does not change the regulatory status of Hydromatix 786E Ion Exchange Rinsewater Recycling System; it should, however, facilitate and encourage the acceptance of this technology as a pollution prevention alternative to traditional waste water treatment methods and techniques.

Use of this technology may be subject to regulation by federal, state, and local agencies. For each specific application, the end-user must ensure compliance with all applicable regulations and standards established by federal, state, and local agencies.

This certification is issued under the California Environmental Technology Certification Program, and is therefore subject to the conditions set out in the regulations, such as the duration of the certification, the continued monitoring and oversight requirements, and the procedures for certification amendments, including decertification.

By accepting this certification, the manufacturer assumes, for the duration of the certification, responsibility for maintaining the quality of the manufactured materials and equipment at a level equal or better than was provided to obtain this certification and agrees to be subject to quality monitoring by DTSC as required by the law, under which this certification is granted.

Duration of Certification

This certification will remain in effect for three years from the date of issuance, unless it is amended or revoked for cause.