United States
Environmental Protection
Agency

Center for Environmental Research
Information
Cincinnati OH 45268

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EPA TECHNOLOGY TRANSFER

The Bridge Between
Research and Use

Design Manual for Onsite Wastewater Treatment and Disposal Systems Featured at 1980 WPCF Conference

The Technology Transfer *Design Manual for Onsite Wastewater Treatment and Disposal Systems* will be distributed at the 53rd Annual Conference and Exhibition of the Water Pollution Control Federation (WPCF) in Las Vegas, Nevada, September 28 - October 2, 1980.

Because of the recent population movements to rural areas and poor public acceptance of onsite systems in the past, EPA has developed this new design manual to provide technical guidance on the design, construction and maintenance of onsite treatment systems The manual was written by personnel from SCS Engineers and Rural Systems Engineering Contract supervision was provided by the EPA Office of Water Program Operations and the Municipal Environmental Research Laboratory in Cincinnati, Ohio. The manual was published in cooperation with the Center for Environmental Research Information, Cincinnati, Ohio.

This manual covers guidelines for (1) design, including such topics as wastewater characteristics, treatment and disposal methods, and strategy for onsite system design, (2) construction, including a procedure for conducting a site evaluation; and (3) management of onsite systems, including a discussion of theory and types of management.

Several EPA organizations have pooled resources to form an EPA service and exhibit center at this year's WPCF Conference. Specific areas of interest to be featured in EPA exhibits are effluent guidelines, controlled and uncontrolled hazardous waste, groundwater and underground injection, water quality management, construction grants, and the research and development contribution to water pollution control. Individuals will be available at each exhibit to discuss EPA policy and answer questions We invite you to visit the EPA displays and pick up a copy of the *Onsite Wastewater Treatment and Disposal Systems Design Manual,* at Booth No. 592. To order this Manual, fill out the order form at the back of this Newsletter (#1012) and return it to CERI.

Sulfide Precipitation Summary Report for Metal Finishing Industry

The Center for Environmental Research Informaton has published a new Summary Report discussing sulfide precipitation as a wastewater treatment technique for electroplating and other metal finishing operations. The report was developed by the Metals and Inorganic Chemicals Branch, Industrial Environmental Research Laboratory, Cincinnati, Ohio. It is the second in a series of control and treatment technology alternatives for the electroplating industry. The first report discusses evaporation as a technique for recovering plating chemicals from wastewater.

The 1977 Clean Water Act requires that metal finishing operations control the oxidation of cyanide, the reduction of hexavalent chromium, the removal of heavy metals, and pH. Sulfide precipitation is one of many methods available for removing metals from metal finishing process wastewater.

Metals are commonly removed by adding an alkali, such as hydrated lime or caustic soda, to adjust the pH of the wastewater to the point where metals exhibit minimum solubilities and will therefore precipitate out as metal hydroxides. In some metal finishing operations, th hydroxide process may exhibit limited removal efficiencie due to solubility characteristics of metals at different p values and the presence of complexing ions. If this occur sulfide precipitation is an alternative to hydroxide precip tation. The high reactivity of sulfides with heavy metal ion and the insolubility of heavy metals to sulfides over a broa pH range are attractive features as compared to hydroxid precipitation. Sulfide precipitation can also achieve lo metal solubilities in the presence of complex ions

Sulfide precipitation can be either soluble or insoluble. I the soluble sulfide precipitation (SSP) process, the sulfid is added as a water-soluble reagent such as sodiu sulfide. The insoluble sulfide precipitation (ISP) proces adds a slightly soluble ferrous sulfide (FeS) slurry to th wastewater to supply the sulfide ions needed to precipitat the heavy metals.

This report describes the soluble and insoluble sulfid process theory; presents plant evaluations, syste descriptions, and performance, and discusses costs an reliability for the treatment systems and components.

To order the report, complete the order form at the back this Newsletter (#8003) and return it to CERI.

Addendum to Choosing the Optimum Financial Strategies Publication (Publication 3005)

Since the October 1978 printing of *Choosing Optimum Financial Strategies*, two elements that can have a significant bearing upon the choice of strategy for pollution control investment have changed. Those two elements are the Federal Tax Law, which has been modified, and interest rates, which have sharply increased. An update to the original publication has been prepared to describe these changes and to present a number of examples from the original publication that have been recalculated t illustrate their effect. Also revised are state financing an tax incentives and user charge/industrial cost recover systems.

Future distribution of the *Optimum Financial Strategie* report will include a copy of the Update. To order a copy o the Update only, call or write:

Norm Kulujian
USEPA—CERI
Cincinnati, OH 45268
(513) 684-7394

CERI Initiates New Publication Series for Industry

A new series of reports *Environmental Regulations and Technology*, is being instituted to inform those in specified industries affected by environmental regulations, about the latest developments in legislation and techniques for compliance The first report for the electroplating industry will be available in October 1980 Reports targeting other industries will be produced after effluent guidelines are promulgated

The electroplating report entitled, *Environmental Regulations and Technology: The Electroplating Industry* EPA-625/10-80-001, provides the electroplating industr with a summary of the laws, regulatory activities, an technologies that can affect electroplaters' decisions fo wastewater pollution control and solid waste handling an disposal. The regulations recently promulgated by EPA ar presented and water pollution control technologies ar discussed. The report also includes information on th current status of sludge disposal regulations, technologie and operating techniques that can reduce sludge disposa costs, and financial assistance available through federall sponsored programs.

A copy of this report can be ordered by completing the forr at the back of this Newsletter (#10001), and returning it t CERI

;eminar for Corrosion ;ontrol in Water Distribution Systems

seminar on Corrosion Control in Water Distribution ystems, held at the EPA Environmental Research Center Cincinnati, Ohio, May 20-22, 1980, was attended by 141 ersons, including visitors from Canada, England, West ermany and the Netherlands The seminar, sponsored by RD's Drinking Water Research Division of the Municipal nvironmental Research Laboratory, was held to discuss. ie EPA proposal to regulate corrosivity in drinking water mong the topics discussed at the meeting were costs icurred by corrosion and health effects from substances that may be found in drinking water because of corrosion, regulatory programs to control corrosion, chemistry of corrosion; and both water utility activities and EPA research in support of corrosion control Most of the speakers and audience agreed that even though corrosion problems have existed for decades, much work still needs to be done to understand and control corrosion in water distribution and consumer plumbing systems The diversity of water quality throughout the United States and the many kinds of materials used in water distribution and consumer plumbing systems make corrosion control an exceedingly complex problem that defies a simple, universally applicable solution

Vater Quality Management 'rade-Offs Seminar

. seminar on "Water Quality Managements Trade-Offs — oint Source vs Nonpoint Source Pollutant" was held eptember 16-17, 1980, at the Pick Congress Hotel in hicago, Illinois The Center for Environmental Research nformation, in cooperation with the USEPA Region V ireat Lakes National Program Office, sponsored the eminar

The purpose of the seminar was to evaluate the effect of point and nonpoint source pollution on receiving waters, especially the Great Lakes In controlling these pollutants, trade-offs can be made which will most economically meet water quality goals. Water quality policy issues for the Great Lakes were discussed, followed by presentations on the various pollutant sources and their effects, load reductions through management practices, and a methodology for integrating point and nonpoint source pollution assessment

'reatability Manual Published

ince 1979, EPA's Office of Enforcement and Office of Vater and Waste Management, with requested help from ie Office of Research and Development, have been ompiling wastewater treatment performance data into a *reatability Manual.* The first complete edition of the Manual, printed in five volumes, is now available for eview at Region Offices and can be purchased from the iovernment Printing Office. The Manual will be used in eveloping NPDES permit limitations for facilities which, at ie time of permit issuance, were not fully covered by romulgated, industry-specific effluent guidelines uthorized under Sections 301, 304, 306, 307, and 501 of ie Clean Water Act

he planning group which managed the treatability project vas chaired by William Cawley, Deputy Director, Indusrial Environmental Research Laboratory-Cincinnati The roup includes participants from: (1) Industrial Environental Research Laboratory-Cincinnati, (2) Effluent Guidelines Division, Office of Water and Waste Manageent, (3) Permits Division, Office of Enforcement, 4) Municipal Environmental Research Laboratory-Cincinnati, (5) Robert S Kerr Environmental Research aboratory-Ada, (6) Industrial Environmental Research Laboratory-Research Triangle Park, (7) National Enforcement Investigation Center, Office of Enforcement, (8) Center for Environmental Research Information, (9) Monsanto Research Corporation, (10) Aerospace Corporation, and (11) MATHTECH, Inc

The objectives of the treatability project are

- to provide readily accessible data and information on treatability of industrial and municipal waste streams for use by NPDES permit writers, enforcement personnel, and by industrial or municipal permit holders
- to provide a basis for research planning by identifying gaps in knowledge of the treatability of certain pollutants and wastestreams, and
- to set up a system allowing rapid response to program office requirements for generation of treatability data.

The primary output from this program is a five-volume *Treatability Manual.* The individual volumes are named as follows:

Volume I - Treatability Data
Volume II - Industrial Descriptions

Volume III - Technologies for Control/Removal of Pollutants
Volume IV - Cost Estimating
Volume V - Summary

Volume I supplies data on the specific compounds listed in the Consolidated Permit Application Form 2C (NPDES) published May 19, 1980. It is intended to provide facsimile reference to physical data on the pollutants, their occurrence patterns, and methods of treatment and/or removal. Pollutants are grouped according to the following chemical categories:

- Metals and Inorganics
- Ethers
- Phthalates
- Nitrogen Compounds
- Phenols
- Aromatics
- Polynuclear Aromatic Hydrocarbons
- PCB's and Related Compounds
- Halogenated Hydrocarbons
- Pesticides
- Oxygenated Compounds
- Miscellaneous

Volume II provides generic process descriptions for the industrial categories. The categories not currently included will be added as sufficient information becomes available.

The objective of Volume II is to characterize the wastewaters discharged from the above categories on a facility-by-facility basis prior to pretreatment and after treatment. The pollution control methods used with the treated final effluent pollutant concentrations are also provided.

Each industrial category is defined according to the Standard Industrial Classification (SIC) Codes of the U.S. Department of Commerce and by the general industrial description found in current contractor draft development documents and published development documents on each industry. The categories are generally divided into subcategories which are described when sufficient data are available The total number of facilities in each category discharging an aqueous effluent either directly to a receiving stream or indirectly to a publicly owned treatment works (POTW) is given in an industrial summary table.

Wastewater characteristics are provided for each category/subcategory when sufficient information is available. Subcategory wastewater characteristics are broken into separate processes when sufficient data are available. These descriptions include the complete pollutant analyses available in the references. These analyses generally consist of conventional and classical pollutants, the 129 toxic pollutants, and other miscellaneous pollutants found in the wastewater. The data presented should be assumed screening quality unless specifically labeled verification quality

Plant-specific descriptions are also in this volume. These descriptions generally include a treatment system description, plant production, and wastewater flow. Conventional, classical, and toxic pollutant concentration data, as well as treatment system removal efficiency are presented in site specific tables.

Volume III presents performance data and related technical information for 56 unit operations used in industrial water pollution control. These operations include 24 sludge treatment and disposal technologies and 32 generic wastewater treatment technologies classified as preliminary, primary, secondary, or tertiary treatment

Each wastewater or sludge treatment/disposal technology is briefly described, and generalized performance characteristics are given for the preliminary wastewater treatment (conditioning) and sludge processing technologies However, emphasis is placed on the pollutant removal capabilities of the 28 primary, secondary, and tertiary wastewater treatment technologies. Both concentration and removal efficiency data are given for the following group of pollutants.

(1) conventional pollutants such as biochemical oxygen demand (BOD_5), total suspended solids (TSS), pH, oil and grease, and fecal coliform.

(2) 129 toxic pollutants derived by EPA from the 65 "priority pollutants" listed in a Consent Agreement, *Natural Resources Defense Council v Train,* 8 ERC 2120 (D.D.C 1976);

(3) compounds selected from the list of substances designated by EPA as hazardous under authority of Section 311 of the Clean Water Act, based on either a consensus of analytical methods or promulgation under authority of Section 204(h) of the Clean Water Act; and

(4) other nonconventional pollutants of concern in specific industrial wastewaters.

Volume IV presents total capital investment and annual operating cost information for 78 wastewater treatment technologies The 78 technologies are grouped into the following classifications: wastewater conditioning, primary wastewater treatment, secondary wastewater treatment, tertiary wastewater treatment, sludge treatment, and disposal A general overview of each technology is followed by discussion of common modifications, typical equipment, and a process flow diagram. A brief discussion

of design criteria is also presented, along with any assumptions used in developing costs for that technology alone. The cost information for each technology is displayed in graphs showing cost in millions of dollars versus wastewater flowrate or pollutant loading, as appropriate. All costs are indexed to September 1979, corresponding to an Engineering News Record Index of 3119, unless otherwise noted. (Further discussion is found in Appendix A — Economic Assumptions.)

The data presented are generalized, rather than site-specific, and estimates derived solely from it are valid only for comparison purposes. Even these comparisons must be performed with caution because of the possible differences in reliability of performance and cost information from various sources

Cost data presented have been derived from EPA publications, open literature, construction grant files and from equipment manufacturers' information. Accuracy of the data appears to depend on the frequency of use of a particular process For example, the costs associated with activated sludge processes or sedimentation with chemical addition appear more reliable than those for reverse osmosis or other processes with few examples of full-scale installation.

Volume V summarizes Volumes I through IV and outlines their potential utility to National Pollutant Discharge Elimination System (NPDES) permit writers. The Treatability Manual, when used in conjunction with other information, will enable permit writers to:

- evaluate the potential effectiveness and costs of proposed effluent treatment systems.
- determine the potential cost and feasibility of compliance with discharge limitations under consideration, and
- develop wastewater pollution control and monitoring requirements to be employed at specific sites.

The *Treatability Manual* is availble from the Government Printing Office (GPO). The following information indicates the actions needed when ordering:

- Superintendent of Documents
  U.S. Government Printing Office
  Department 50
  Washington, DC 20402
- Stock Number: 055-000-00190-1
- Cost per set: $47.00 (Volumes I-V)

Workshop on Water Quality Assessment Methodology

A four-day workshop was held at St. John's College, Annapolis, Maryland, May 12-15, 1980, on water quality assessment methodology for streams, impoundments and estuaries The workshop presented techniques that are included in the manual, *Water Quality Assessment: A Screening Method for Nondesignated 208 Areas* (EPA-600/9-77-023)

The screening method is a simplified technique that can be accomplished with the assistance of a pocket calculator The methodology is intended to be used with little external data input. Consequently, abundant data are included as tables, figures and appendices.

These techniques were applied to watersheds, streams and estuaries in the Chesapeake Bay area and example problems from that study were presented and worked out by the participants. The workshop was attended by engineers, scientists and planners from federal, state and local governmental units and from consulting engineering firms.

Conference Announcement

The "Conference on Innovation in the Environmental Technology Industry" sponsored by the USEPA's Office of Research and Development, Water Pollution Control Federation (WPCF), Air Pollution Control Association (APCA), and Environmental Industry Council (EIC) will be held November 5-6, 1980, at the Capitol Hilton, 16th & K Streets, NW, Washington, D.C. The purpose of the conference will be to explore the key factors and issues influencing the development and marketing of innovative technology in the pollution control industry. Major areas of discussion will be technology assessments, venture capital and financing, impact of regulatory policies, federal patent policy, investment firms perspective, industrial R&D planning and strategy, and foreign technology exchange. For further information, write to: Sheri Marshall, Conference Coordinator, Enviro Control, Inc., P.O. Box 827, Rockville, MD 20851.

Overland Flow Seminar Held

The National Seminar on Overland Flow Technology for Municipal Wastewater was held in Dallas, Texas, on September 16-18, 1980 Seminar sponsors included the USEPA's Center for Environmental Research Information, the Robert S. Kerr Environmental Research Laboratory, and the Office of Water Program Operations. At the seminar, approximately 200 treatment system planners and designers received the latest available information on designing and operating overland flow treatment systems for municipal wastewater. In addition, seminar speakers discussed research projects and case histories of operating systems.

Session moderators included: Ancil A. Jones, EPA Region VI; Richard Duty, Robert S. Kerr Environmental Research Laboratory; and Dick Thomas, EPA Construction Grants Program.

Workshop on Stream Water Quality Modeling

Two-day workshops were held in Annapolis, Maryland, May 6-7, and Chicago, Illinois, May 29-30, 1980, on the use of the stream water quality model — QUAL II. The objectives of the workshops were to present the theory used in the QUAL II Model and to instruct the participants on its use in a comprehensive basin planning/waste load allocation situation.

The workshops were sponsored by the USEPA's Center for Water Quality Modeling, Environmental Research Laboratory, Athens, Georgia, in cooperation with the Center for Environmental Research Information Additional workshops on use of this model may be presented in the future. For information contact Orville Macomber, USEPA, Center for Environmental Research Information, Cincinnati, Ohio 45268, (513) 684-7394.

New Capsule Reports on Restoration of Polluted Lakes

EPA's Clean Lakes Program, Criteria and Standards Division, Washington, D C , has funded cost-sharing projects under Section 314 of the Federal Water Pollution Control Act, as Amended, to restore freshwater lakes for public use Capsule reports have been prepared on three lake restoration projects to present the methodologies used in selecting and applying a treatment Also included in the reports are costs of treatment and the results that were achieved A variety of treatment methods were used including dredging, addition of alum to control phosphorus, detention basins to control sediment and fecal coliforms, and source controls such as construction of structures to control farm animal wastes in the lake watershed. The capsule reports are entitled:

Restoration of Medical Lake (Washington)
Restoration of Lake Temescal (California)
Lake Restoration in Cobbossee Watershed (Maine)

These reports can be obtained by filling out the order form at the back of this Newsletter with the appropriate boxes checked #2025 (Medical Lake); #2026 (Lake Temescal); #2027 (Cobbossee), and returning the form to CERI.

EPA Active I/A Program

The Clean Water Act of 1977 and the regulations which implement it encourage the use of innovative and alternative (I/A) technologies as solutions to municipal wastewater and sludge management needs. Special emphasis is given to technologies that conserve or recover energy, reduce total costs, reclaim or reuse water, recycle wastewater constituents, or eliminate surface discharges.

The current I/A technology program officialy began on October 1, 1978, and re-oriented the EPA Construction Grants Program to fund a greater number of these I/A technologies. In addition to requirements such as mandatory consideration of I/A solutions in planning future facilities, a number of positive incentives are provided. These include increased federal construction grant assistance for I/A technologies and 100 percen federal grants to correct or replace I/A technology failures By fiscal year 1981, it is anticipated that one out of fou

EPA grant projects will involve I/A technology to some degree. However, many states are presently having difficulty identifying a sufficient number of appropriate I/A technology projects to fully utilize the funds specifically set aside by Congress for this purpose.

In accordance with EPA Administrator Douglas Costle's directive, the Agency has initiated an "active" I/A technology program in order to encourage greater use of I/A technologies and to generate more I/A projects. EPA staff and organizations dedicated to the active I/A program include Gary R. Lubin, MERL-Cincinnati (513/684-7630) and Robert P G. Bowker, MERL-Cincinnati (513/684-7620); Curtis Harlan, Robert S Kerr Environmental Research Laboratory-Ada, Oklahoma (405/743-2212). This new I/A program effort is a necessary addition to actions which EPA has already undertaken, such as establishment of state and regional I/A coordinators, (see attached list), the development of an I/A Technology Assessment Manual, the presentaton of special I/A program seminars across the nation, and the formation of an I/A technology clearinghouse and technical support group to help disseminate information and to assist in review of I/A project applications.

The active I/A technology program is a joint effort of the EPA Construction Grants and Research and Development Programs The overall thrust of this program is to.

- Identify recently developed "emerging" I/A technologies ready for implementation.
- Identify and recommend project sites throughout the country that can potentially benefit from emerging technologies.
- Assist local communities and their consulting engineers with assessment and analysis of emerging technologies that may be applicable to their specific wastewater treatment control or management problems.
- Provide consulting engineers with detailed planning and engineering assistance on a project-by-project basis
- Assist regional and state I/A coordinators in developing active I/A projects by reviewing priority project planning information and recommending new technologies to be considered.

A special emphasis of the active I/A technology program is to provide *direct technical and administrative EPA assistance* to municipalities in the actual development of I/A projects at the local level. The EPA is working closely with local and state governments, public participation groups, consultants, and equipment manufacturers in this new effort. Since the successful development of I/A projects depends on the attitudes of these groups, we try to work individually, on a one-to-one basis, to promote cooperation

Two examples of active I/A projects which show promise are located in Montrose, Colorado, and Hanover, New Hampshire. The EPA has been working with the city of Montrose and the consulting firm of Roy F Weston and VTR, Inc to investigate the application of a vertical tube chemical reactor method of treatment to treat 3.23 mgd of a raw municipal/industrial high strength waste. The Montrose project reached another milestone on July 24, 1980 when a field test using a 1700 ft -deep test well was conducted in order to verify a laboratory treatability model Preliminary results from the facility plan indicate that this unique application of deep well chemical oxidation significantly exceeds the innovative technology cost and energy qualifying criteria This technology also exhibits significant potential for treating municipal sludge while generating energy

In New Hampshire, the EPA has been working closely with the city of Hanover, the state, and the consulting firms of Hoyle and Tanner and J. I Associates in the proposed use of an anaerobic expanded-bed fixed-film process to treat 2 mgd of domestic primary effluent Review of the process indicates significant cost and energy savings over a conventional alternative. In general, anaerobic systems are receiving renewed attention as a cost and energy efficient method of treating domestic wastewaters The city of Hanover is pursuing a facility planning revision and work on a design report for this process. In a departure from a business as usual approach, the EPA will be one member of a joint design review team and will provide direct aid in the further development of this process as it is undergoing full-scale design In the implementation of the Montrose and Hanover projects, EPA will also be encouraging sole source procurement and patent exemptions in accordance with recently issued policy directives in these areas. Construction would be initiated under an extended I/A program

Also, as part of the active I/A effort, a number of 40 to 60-page emerging technology assessment reports are being completed and distributed in order to disseminate information on recent advances in the field of waste-water treatment. In selected technologies, the emerging technology assessment report describes the stage of development including pilot, demonstration and full-scale; state-of-the-art, cost and energy benefits, technology gaps that must be filled, and present and potential impact on the industry. Assessment reports which have been completed or are near completion include overland flow, vertical tube reactor, anaerobic upflow expanded bed, deep shaft technologies, and solar applications in the treatment of wastewater and sludge Additional assessment reports will address anaerobic biological nutrient removal processes, aquaculture, wetlands, dual sludge digestion, solvent extraction, sequencing batch reactors, heat pump energy recovery, energy conserving materials and design, air-to-air heat exchange, and hydro and wind energy generation

Future activities of the active I/A program include a series of ten seminars on emerging technology to be held during October, November, and December in Boston, New York, Philadelphia, Atlanta, Chicago, Dallas, Kansas City, Denver, San Francisco, and Seattle. The Water and Wastewater Equipment Manufacturers Association is sponsoring the seminars with EPA as a cooperating agency.

A similar prototype emerging technology seminar was recently held in Boston in cooperation with the Consulting Engineers of New England. Due to the initial success of this effort, the EPA hopes to continue to work with the American Consulting Engineers Council in this and other areas. A second round of ten I/A technology workshops is being planned and will include energy analysis and I/A case studies.

In order to find out more about the active I/A program or the I/A program in general, contact one of the federal representatives listed here.

Contact	FTS	Commercial
Lam K. Lim USEPA, WH-547 Washington, DC 20460	426-8976	202/426-8976
John Smith/Gary Lubin/ Bob Bowker USEPA, MERL Cincinnati, OH 45268	684-7611 684-7630 684-7620	513/684-7611 513/684-7630 513/684-7620
Curtis Harlin Robert S. Kerr Environmental Research Laboratory P.O. Box 1198 Ada, OK 74820	743-2212	405/743-2212
Natalie Taub USEPA, Region I JFK Building Boston, MA 02203	223-5604	617/223-5604
Steve Veda USEPA, Region II 26 Federal Plaza New York, NY 10007	264-9596	212/264-9596
James Hagan USEPA, Region III Curtis Building 6th & Walnut Streets Philadelphia, PA 19106	597-9131	215/597-9131
Tom Plouff USEPA, Region IV 345 Courland Street, NE Atlanta, GA 30365	257-4015	404/881-4015
Steven Poloncsik USEPA, Region V 230 S. Dearborn Street Chicago, IL 60604	353-2314	312/353-231
Ancil Jones USEPA, Region VI First International Bldg. 1201 Elm Street Dallas, TX 75270	729-2845	214/767-2845
Lynn Harrington USEPA, Region VII 324 E. 11th Street Kansas City, MO 64106	758-2725	816/374-272
Stan Smith USEPA, Region VIII 1860 Lincoln Street Denver, CO 80203	327-2735	303/837-2735
Irving Terzich USEPA, Region IX 215 Fremont Street San Francisco, CA 94105	556-8316	415/556-831
Carl Nadler USEPA, Region X 1200 Sixth Avenue Seattle, WA 98101	399-1266	206/442-1266

Where to Get Further Information

In order get details on items appearing in this publication, or any other aspects of the *Technology Transfer Program, contact the following individual in your region.*

REGION	CHAIRMAN	ADDRESS
1	Allyn Richardson	Environmental Protection Agency John F. Kennedy Federal Building Room 2313 Boston, Massachusetts 02203 617/223-2226 (Maine, N H., Vt., Mass , R.I , Conn)
2	Robert Bongiovanni	Environmental Protection Agency 26 Federal Plaza, Room 907 New York, New York 10007 212/264-0711 (N.Y., N J , P R., V.I)
3	Albert Montague	Environmental Protection Agency 6th & Walnut Streets Philadelphia, Pennsylvania 19106 215/597-9856 (Pa , W.Va., Md., Del., D.C., Va)
4	Carolyn Mitchell	Environmental Protection Agency 345 Courtland Street, N.E Atlanta, Georgia 30308 404/881-4216 (N C., S.C., Ky , Tenn., Ga , Ala , Miss , Fla)
5	Clifford Risley	Environmental Protection Agency 536 South Clark Street Chicago, Illinois 60604 312/353-3805 (Mich , Wis., Minn , Ill , Ind., Ohio)
6	Information Center	Environmental Protection Agency Office of Public Awareness 1201 Elm Street First International Building Dallas, Texas 75270 214/767-2697 (Texas, Okla., Ark., La., N Mex.)
7	Charles Hajinian	Environmental Protection Agency 324 East 11th Street Kansas City, Missouri 64106 816/374-2921 (Kansas, Nebr , Iowa, Mo.)
8	Dennis Nelson	Environmental Protection Agency 1860 Lincoln Street Denver, Colorado 80203 303/837-4261 (Colo , Mont., Wyo , Utah, N.D , S.D.)
9	Information Center	Environmental Protection Agency 215 Fremont Street San Francisco, California 94105 415/556-1840 (Calif., Ariz., Nev , Hawaii)
10	John Osborn	Environmental Protection Agency 1200 Sixth Avenue Seattle, Washington 98101 206/442-1296 (Wash., Ore , Idaho, Alaska)

USEPA - ORD
Center for Environmental Research Information
Cincinnati, OH 45268
***513/684-7562**

***This is a new telephone number.**

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The publications listed on this form are the only ones available through the Office of Technology Transfer.
(Check appropriate boxes)

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- Carbon Adsorption (Oct 1973) . . . 1002 ☐
- Suspended Solids Removal (Jan 1975) . . . 1003 ☐
- *Upgrading Existing Wastewater Treatment Plants* (Oct 1974) . 1004 ☐
- Sulfide Control in Sanitary Sewerage Systems (Oct 1974) . . 1005 ☐
- Nitrogen Control (Oct 1975) . . . 1007 ☐
- Land Treatment of Municipal Wastewater (Oct 1977) . . 1008 ☐
- Wastewater Treatment Facilities for Sewered Small Communities (Oct 1977) . . . 1009 ☐
- Municipal Sludge Landfills (Oct 1978) . . . 1010 ☐
- Sludge Treatment and Disposal (Oct 1979) . . . 1011 ☐
- Onsite Wastewater Treatment and Disposal Systems (Oct 1980) . . 1012 ☐

TECHNICAL CAPSULE REPORTS

- Color Removal from Kraft Pulping Effluent by Lime Addition . . . 2002 ☐
- First Progress Report Limestone Wet-Scrubbing Test Results at the EPA Alkali Scrubbing Test Facility . . . 2004 ☐
- Pollution Abatement in a Brewing Facility . . . 2006 ☐
- Flue Gas Desulfurization and Sulfuric Acid Production via Magnesia Scrubbing . . . 2007 ☐
- Second Progress Report Lime/Limestone Wet-Scrubbing Test Results at the EPA Alkali Scrubbing Test Facility . . . 2008 ☐
- *Magnesium Carbonate Process for Water Treatment* . . . 2009 ☐
- *Third Progress Report Lime/Limestone Wet-Scrubbing Test* Results at the EPA Alkali Scrubbing Test Facility . . . 2010 ☐
- First Progress Report Wellman-Lord SO_2 Recovery Process — Flue Gas Desulfurization Plant . . . 2011 ☐
- *Swirl Device for Regulating and Treating Combined* Sewer Overflows . . . 2012 ☐
- Fabric Filter Particulate Control on Coal-Fired Utility Boilers Nucla, CO and Sunbury, PA . . . 2013 ☐
- First Progress Report Static Pile Composting of Wastewater Sludge 2014 ☐
- *Efficient Treatment of Small Municipal Flows at Dawson, MN* . . . 2015 ☐
- Double Alkali Flue Gas Desulfurization System Applied at the General Motors Parma, OH Facility . . . 2016 ☐
- Recovery of Spent Sulfuric Acid from Steel Pickling Operations . . . 2017 ☐
- Fourth Progress Report Forced-Oxidation Test Results at the EPA Alkali Scrubbing Test Facility . . . 2018 ☐
- Control of Acidic Air Pollutants by Coated Baghouses . . 2020 ☐
- Particulate Control by Fabric Filtration on Coal-Fired Industrial Boilers 2021 ☐
- Bahco Flue Gas Desulfurization and Particulate Removal System . . 2022 ☐
- First Progress Report Physical Coal Cleaning Demonstration at Homer City, PA . . . 2023 ☐
- Acoustic Monitoring to Determine the Integrity of Hazardous Waste Dams . . . 2024 ☐
- Restoration of Medical Lake (Washington) . . . 2025 ☐
- Restoration of Lake Temescal (California) . . . 2026 ☐
- Lake Restoration in Cobbossee Watershed (Maine) . . . 2027 ☐

INDUSTRIAL SEMINAR PUBLICATIONS

- Upgrading Poultry Processing Facilities to Reduce Pollution (3 Vols) . . 3001 ☐
- *Upgrading Meat Packing Facilities to Reduce Pollution* (3 Vols). 3003 ☐
- Upgrading Textile Operations to Reduce Pollution (2 Vols) . . . 3004 ☐
- Choosing the Optimum Financial Strategies for Pollution Control Systems 3005 ☐
- Erosion and Sediment Control — Surface Mining in the Eastern U S (2 Vols) . . . 3006 ☐
- Pollution Abatement in the Fruit and Vegetable Industry (3 Vols) . . 3007 ☐
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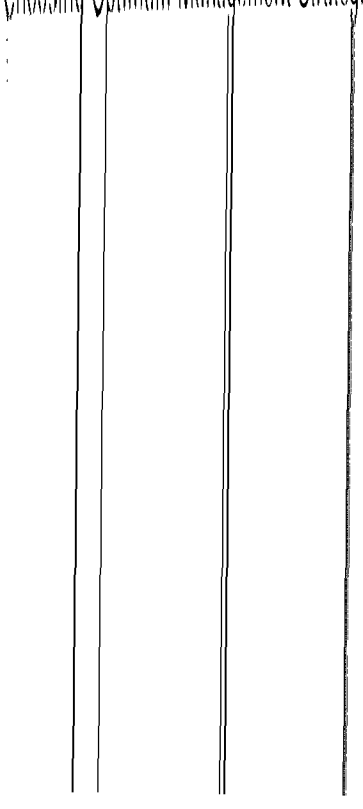

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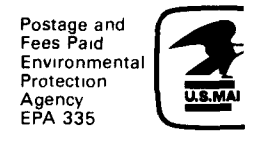

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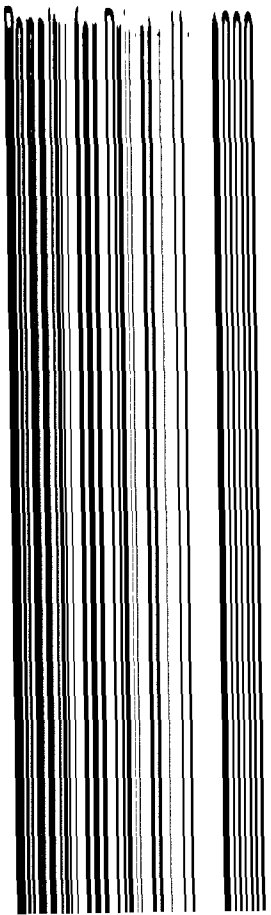

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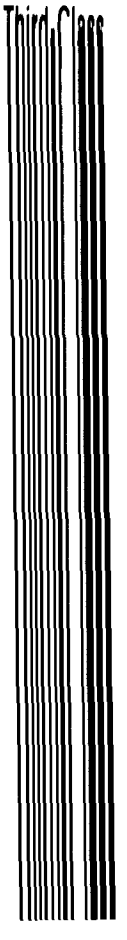

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