

TECHNOLOGY TRANSFER

The Bridge Between
Research and Use

New Technology Transfer Publications

Manual: Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment (#1022)

This new publication is being made available on site to attendees of the 61st Annual Conference and Exposition of the Water Pollution Control Federation in Dallas, Texas, October 2-6, 1988. It compiles all available design and operating criteria for the various systems and includes the following sections:

- Aquatic Treatment Systems
- Environmental and Health Considerations
- Design of Constructed Wetlands
- Design of Aquatic Plant Systems
- Case Studies and Design Examples

These systems include natural and constructed wetlands, ponds, raceways and other structures that are based on combinations of aquatic plants and animals. Interest in aquatic treatment systems for wastewater can be attributed to four basic factors:

1. Public demands for more stringent wastewater effluent standards, including removal of nutrients and trace contaminants as well as organic and suspended matter;
2. Rapidly escalating costs of construction and operation associated with conventional treatment facilities;
3. Recognition of the natural treatment functions of aquatic plant systems and wetlands, particularly as nutrient sinks and buffering zones; and
4. In the case of wetlands, emerging or renewed application of aesthetic, wildlife, and other incidental environmental benefits associated with the preservation and enhancement of wetlands.

Manual: Waste Minimization Opportunity Assessment (#7003)

This new publication has been developed to assist waste generators in meeting current demands to reduce waste. Basic information is provided in developing a waste minimization audit program, with most of the material focused to assist manufacturing facilities. However the generic approach utilized in this manual is presented so that much of this subject matter is applicable to other segments of industry, government or business.

The manual is to be used as a source of concepts and ideas. It begins with definitions of terms used in waste minimization practices. This is followed by brief discussions of incentives for waste minimization and economic considerations.

Five phases of a waste minimization audit program are outlined in this manual:

- Planning and organization
- Information gathering
- Work minimization audits
- Feasibility analysis
- Program implementation

Waste minimization audit procedures incorporated in the manual are intended to motivate the user to search, screen and put into practice measures involving administrative, material, or technology changes that result in decreased waste generation.

Waste Minimization action is a policy specifically mandated by the U.S. Congress in its Hazardous and Solid Waste Amendments of 1984 to RCRA, and with the unprecedented increase in cost of waste management, a heightened general interest in waste minimization is now at hand. Additional contributing factors to interest in waste minimization is the desire on the part of generators, to reduce their environmental impairment liabilities under the provisions of CERCLA (Superfund).

Future Technology Transfer Meetings

Seminar Series: Leak Detection Methods for Underground Storage Tanks

Four seminars will be held this Fall to acquaint the environmental technical community with methods for detecting leaks from underground storage tanks (USTs). The seminars will be presented in the following locations:

- San Francisco, CA - September 12-13, 1988
- King of Prussia, PA - September 26-27, 1988
- Atlanta, GA - October 27-28, 1988
- Rosemont, IL - November 29-30, 1988

The purpose of these seminars is to present results of EPA's research effort to determine the performance of UST leak detection methods. The seminar sessions will be presented by those who have been involved in this research. With information from these sessions, attendees will be better equipped to select and integrate tests and thus help manufacturers improve their procedures and equipment.

EPA's Office of Research and Development is providing this information through studies conducted by its Risk Reduction Engineering Laboratory in Edison, NJ and the Environmental Monitoring Systems Laboratory in Las Vegas, NV.

These two-day seminars are designed for manufacturers of leak detection equipment and instruments, environmental consultants who must choose which tests to use, and

contractors who perform leak detection tests. The agenda will cover internal and external tank testing methods, as follows:

Part I: Overview of UST Leak Detection

Part II: Internal Tank Leak Detection Methods

- Performance of UST Leak Detection Methods
- Evaluation Methodology
- Volumetric Tank Testing
- Line Leak Detection
- Automatic Tank Gauging Systems
- Selection of In-Tank Detection Option

Part III: External Tank Leak Detection (second day)

- Background
- Site Assessment/Risk Assessment
- Groundwater Monitoring
- Vapor Monitoring
- Setting Alarm Levels

Part IV: Integrating Internal and External Methods

- Deciding on a Monitoring Strategy
- Panel Discussion

There is no fee for attending these seminars. For registration information contact Ursula S. Thomas at JACA Corp., Fort Washington, PA (215) 643-5466. For additional program information contact: Carol Grove, USEPA-CERI, 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

Seminar Series: Field Evaluations of Municipal Wastewater Treatment Technologies

Five two-day seminars will be conducted, presenting advances in municipal wastewater treatment. Advances in municipal wastewater treatment technology continue to develop at a dramatic pace, with several hundred Innovative and Alternative (I/A) projects now in operation across the country. Many studies have been undertaken by the U.S. Environmental Protection Agency to ascertain actual field-scale performance and capital and O&M costs of I/A technologies, as well as to document problems encountered with their design, construction, and operation. Specifically, this seminar series will:

- *Provide actual full-scale operating data* to improve the data base of design engineers and their client municipalities in properly considering alternative municipal wastewater collection and treatment systems and in performing accurate cost-effective analyses of these alternatives. This will increase the probability of optimum system choice.
- *Identify problem technologies* that have not performed as anticipated, necessitating modification and/or replacement (M/R) actions. The performance, design, and operation of these technologies will be discussed.

This seminar series will present information on several new technologies not covered in previous seminars, as well as newly developed design, performance, and operating data on some technologies that were. The information presented will be of major benefit to those involved in the evaluation, design, and/or approval of municipal wastewater systems, especially I/A technology applications.

Specific technologies to be addressed include: sulfide corrosion of sewers, rainfall-induced infiltration, exfiltration, intrachannel clarifiers, draft tube aeration, constructed

wetlands, UV disinfection, in-vessel composting, low-energy incineration.

The seminars will be presented in the following locations:

Schenectady, NY - December 7-8, 1988
Charlotte, NC - January 9-10, 1989
Chicago, IL - January 12-13, 1989
Spokane, WA - January 23-24, 1989
San Francisco, CA - January 26-27, 1989

There is no registration fee. Additional information can be obtained by contacting: Denis Lussier, USEPA-CERI, 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

Workshop Series: Bioremediation of Hazardous Waste Sites

A series of two-day workshops is being developed to an in-depth look at assessing the viability of biosystems for the treatment of hazardous wastes and implementing onsite remediation. These workshops will focus on:

- identification of the necessary site or waste characteristics to utilize biological treatment
- evaluation of the role of treatability tests in assessing performance
- application of appropriate reactor design and/or in-situ treatment
- evaluation of pre- and post-biotreatment operations and life-cycle design.

These workshops will be offered in early 1989, in 8-10 major industrial areas. There is no registration fee. For further information contact Fran Kremer, USEPA-CERI 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268.

Workshop Series: Emerging Technologies for Upgrading Existing or Designing New Drinking Water Treatment Facilities

These 2-1/2 day workshops are sponsored and organized by a local section of the American Water Works Association (AWWA) and EPA's Regional Offices, as well as Offices of Drinking Water and Research and Development. The workshops will present technical information on proven technologies to encourage their use in either plans for process modification or new construction. Removal processes for lead, radon, volatile organics, synthetic organics and disinfection byproducts are discussed along with filtration, disinfection and corrosion control technologies.

These sessions are primarily intended for regional, state and local drinking water regulatory personnel who approve plans for the construction of new or the upgrading of existing drinking water treatment facilities. Consulting engineers and drinking water treatment equipment manufacturers will also find these workshops helpful.

Workshops have to date been held in Philadelphia, PA, St. Louis, MO, Tallahassee, FL, San Francisco, CA, and Spokane, WA. Future workshop dates and locations are as follows:

Boston, MA - November 1-2, 1988
Chicago, IL - November, 1988
Dallas, TX - February, 1989

There is no registration fee. Additional information can be obtained by contacting: Jim Smith, USEPA-CERI, 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

Workshop Series: Waste Minimization

A series of five two-day workshops on the topic of waste minimization in industry is being developed. These workshops will focus on audit, management, and engineering applications for waste minimization and reduction opportunities in several key industries.

A substantial part of the workshop program will be devoted to industry-specific sessions that will be conducted simultaneously to allow attendees to participate in the session of their interest. Case studies of successful application of waste minimization will also be presented. In addition, attendees will have the opportunity for direct problem solving of hypothetical waste minimization situations.

Tentative plans are to hold workshops in Atlanta, Baltimore, Chicago, Houston, and Seattle. Individuals on the mailing list to receive this Newsletter will receive a copy of the announcement for this workshop series when it is completed. The announcement will contain a final agenda, dates, and locations for the workshops.

There will be no registration fee for these workshops. Additional information on the contents of the workshops can be obtained by contacting Doug Williams, USEPA-CERI, 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

Seminars on "Corrective Action Technologies and Applications" Completed

The fifth in this series of seminars was held in Los Angeles on June 14-15, 1988 at the Westin Bonaventure Hotel. These Seminars provided information on alternative technologies for implementing corrective measures when RCRA/CERCLA cleanup activities are required.

The seminars covered the basic screening methods for evaluating suitable technologies along with examples of successful applications in the field. Specific topics included pollutant containment, preinvestigative measures, chemical detoxification methods, biological treatment, thermal treatment, solidification/stabilization of wastes, and management issues for successfully implementing corrective measures. These topics also dealt with interim as well as long term management and technology application issues involving corrective measure implementation.

Work is underway to produce a Technology Transfer Seminar Publication that will be available in early 1989.

Workshop on "Drinking Water Contamination" Completed

The fourteenth in this series of workshops was held at the Hilton Inn in Valley Forge/King of Prussia, Pennsylvania, August 22-24, 1988. These workshops were designed with input from States and USEPA Regional representatives to address their specific program needs for responding effectively to drinking water contamination incidents when they occur. They were also designed to provide consistent processes for officials involved in managing drinking water contamination incidents nationwide.

Topics included health effects of contaminants, analytical methods, and best available treatment technologies for three major classes of chemicals: volatile organics, inorganics and pesticides. Current regulatory initiatives were discussed, and

an overview of USEPA's Office of Drinking Water Health Advisory Program was given.

Each workshop attendee had an opportunity to take part in hands on case studies designed to demonstrate risk assessment and risk management procedures for specific chemicals of concern (i.e., aldicarb, TCE and vinyl chloride). Methods of risk communication were also examined.

Speakers were from EPA's Office of Drinking Water, Office of Research and Development and regional offices, state and local offices, and consulting organizations.

Work is underway to produce a Technology Transfer Seminar Publication that will be available this Fall. Additional information can be obtained by contacting Jim Smith, USEPA-CERI, 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268.

AWWA National Meeting and Convention

The EPA Offices of Research and Development (ORD) and Drinking Water (ODW) cooperated in an exhibit at the June 19-23, 1988 American Water Works Association National Meeting in Orlando, Florida. Approximately 11,000 state and utility personnel along with consultants, manufacturers and academicians registered for this meeting.

As part of the exhibit, ORD demonstrated the Integrated Risk Management System (IRIS). IRIS is an electronic data base containing health risk and EPA regulatory information on specific chemicals. It was developed for EPA staff in response to the growing demand for consistent risk information on chemical substances for use in decision-making and regulatory activities. IRIS is accessible to state and local environmental health agencies. It is available to libraries, private citizens and other organizations through Dialcom, Inc. Electronic Mail telecommunications system.

Also, as part of the exhibit, ORD displayed and made available to participants the following publications that are pertinent to the Agency's Drinking Water Program. These publications can be ordered free of charge (while in stock) from:

ORD Publications

Center for Environmental Research Information
U.S. Environmental Protection Agency
26 W. Martin Luther King Drive
Cincinnati, OH 45268

- *A Study of Possible Economical Ways of Removing Radium from Drinking Water*, Project Summary, EPA/600/S2-88-009, April 1988.
- *Statistical Models for Water Main Failures*, Project Summary, EPA/600/S5-87/003, January 1988.
- *Nitrate Removal from Contaminated Water Supplies: Volume II*, Project Summary, EPA/600/S2-87/034, August 1987.
- *Removal of Uranium from Drinking Water by Ion Exchange and Chemical Clarification*, Project Summary, EPA/600/S2-87/076, December 1987.
- *Limestone Bed Contactors for Control of Corrosion at Small Water Utilities*, Project Summary, EPA/600/S2-86/099, February 1987.
- *Treatment Alternatives for Controlling Chlorinated Organic Contaminants in Drinking Water*, Project Summary, EPA/600/S2-87/011, April 1987.

- *USEPA Manual of Methods for Virology*, EPA/600/4-84/013.
- *Health Effects Assessment Documents*, Project Summary, EPA/540/S1-86/059, March 1986.
- *Low-Cost/Low-Technology Aeration Techniques for Removing Radon from Drinking Water*, Research Brief, EPA/600/M-87/031.
- *Relationships Between Water Quality and Corrosion of Plumbing Materials in Buildings*, Project Summary, EPA/600/S2-87/036.
- *ORD Publications Announcement*.

The SITE Program and Information Clearinghouse - Update

In 1986, EPA's Offices of Solid Waste and Emergency Response and Research and Development established the Superfund Innovative Technology Evaluation or SITE program. The purpose is to assist technology developers in the evaluation of new and innovative treatment, measurement, and monitoring technologies. Through treatment technology demonstrations, the SITE program seeks to encourage the use of alternative or innovative treatment technologies at Superfund and other hazardous waste sites to achieve more permanent protection of human health and the environment.

Under the program, EPA jointly conducts full-scale technology demonstration and evaluation project with a developer at a Superfund site. The developer demonstrates the technology, while EPA evaluates the performance of the technology, its reliability and costs. In addition, EPA is assisting private industry in developing emerging technologies from the conceptual stage to pilot-scale demonstration through cost-sharing agreements.

EPA will document the SITE demonstration results in reports to be made available to Federal, State and private cleanup managers and other interested parties. Recognizing that access to this, and other treatment information, is essential to the acceptance and use of alternative technologies, the SITE program developed an Information Clearinghouse to collect, synthesize and disseminate technology performance data. The clearinghouse has three components:

- A hotline provides callers with up-to-date information on SITE projects, demonstration schedules and the availability of the results, and also refers callers to other sources of information. The number is 800-424-9346 or (FTS) 382-3000 in Washington, DC.
- An electronic bulletin board, part of a planned computerized database network, provides summary information on the SITE projects, demonstration schedules and results. Since we are in the pilot phase, this bulletin board is currently only available to Federal and State hazardous waste cleanup personnel. These personnel may contact Jim Cummings, EPA's Office of Solid Waste and Emergency Response, 202-382-4686 (FTS 382-4506), for information on joining the electronic bulletin board.
- A collection of reports, journals and other documents is housed in the EPA Library's Hazardous Waste Collection. This collection is available at EPA Headquarters and is accessible using onsite personal computers at EPA's 10

regional office and five laboratory libraries. SITE documents will be added as they become available.

EPA envisions expanding this Information Clearinghouse to include data generated by other EPA programs. For more information on the clearinghouse, contact the hotline at 800-424-9346 or (FTS) 382-3000 in Washington, DC. Several reports will be available shortly from the SITE program. A final report on the Peak Oil demonstration in Brandon, Florida, will be available this fall, along with a project summary containing pertinent results and performance data.

The Superfund Innovative Technology Evaluation Program, Progress and Accomplishments - A Report to Congress

EPA is required to submit a report to Congress annually on the progress and results of the SITE program. This Report presents the accomplishments during FY 1987 and through January 30, 1988. During this period a demonstration program, measurement and monitoring techniques development program, and technology transfer program were developed.

The primary focus has been on the demonstration program where the major objective is to develop reliable performance and cost information on innovative technologies so they can be considered in Superfund decision making. At the close of FY 1987, 20 developers had been selected to participate in the program, ten from each of two solicitation cycles. This Report (NTIS No. PB 88-237 482) is available from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Recent ORD and OSWER Hazardous Waste Publications

The following list includes some recent ORD and OSWER technical publications pertaining to hazardous waste treatment and control. You can order these publications from the National Technical Information Service (NTIS), 5285 Port Royal Rd., Springfield, VA 22161 (703) 487-4650. The NTIS ordering number is included.

Technical Resource Document: Treatment Technologies for Halogenated Organic Containing Wastes - Volume 1

NTIS PB88-131271 \$38.95

Technical Resource Document: Treatment Technologies for Corrosive-Containing Wastes - Volume 2

NTIS PB88-131289 \$38.95

Technical Resource Document: Treatment for Metal Cyanide-Containing Wastes - Volume 3

NTIS PB88-143896 \$56.95

Compendium of Costs of Remedial Technologies at Hazardous Waste Sites

NTIS PB88-113477 \$25.95

Manual of Procedures and Criteria for Inspecting the Installation of Flexible Membrane Liners in Hazardous Waste Facilities

NTIS PB88-131313 \$19.95

Hazardous Waste Combustion in Industrial Processes: Cement and Lime Kilns

NTIS PB88-126412 \$14.95

Report on Decontamination of PCB-Bearing Wastes

NTIS PB88-113220 \$14.95

Nondestructive Testing (NDT) Techniques to Detect Contained Subsurface Hazardous Wastes

NTIS PB88-102405 \$14.95

Method for Estimating Fugitive Particulate Emissions from Hazardous Waste Sites

NTIS PB87-232203 \$19.95

Development of Chemical Compatibility Criteria for Assessing Flexible Membrane Liners

NTIS PB87-227310 \$44.95

Reference Manual of Countermeasures for Hazardous Substance Releases

NTIS PB87-232252 \$25.95

Geosynthetic Design Guidance for Hazardous Waste Landfill Cells and Surface Impoundments

NTIS PB88-131263 \$25.95

Superfund Remedial Design and Remedial Action Guidance

NTIS PB88-107529 \$19.95

Sensitivity Analysis for Application of the Inhalation Exposure Methodology (IEM) to Studies of Hazardous Waste Management Facilities

NTIS PB87-232641 \$19.95

Role of Acute Toxicity Bioassays in the Remedial Action Process at Hazardous Waste Sites

NTIS PB88-125430 \$19.95

Hazardous Waste Bibliography

NTIS PB88-142476 \$12.95

Superfund Risk Assessment Information Directory

NTIS PB87-188918 \$19.95

Superfund Public Health Evaluation Manual

NTIS PB87-183125 \$19.95

Data Quality Objectives for Remedial Response Activities:

Development Process. NTIS PB88-131370 \$19.95

Example Scenario: NTIS PB88-131388 \$19.95

U.S. Production of Manufactured Gases: Assessment of Past Disposal Practices

Former sites of gas manufacture present problems for remediation and reuse of the sites. In some cases, polluted groundwater and surface waters are near the sites. This study examines the history of the manufactured-gas industry in the U.S., its production processes, disposal trends, waste toxicity, methods of site investigation, and the current status of manufactured-gas sites. Case studies were prepared for six former gas-manufacturing sites, two by-product tar utilization facilities, a creosoting plant and a coal tar processor. The report is intended as a guide for those examining and evaluating manufactured-gas sites for either environmental risks or possible remediation. NTIS PB88-165790 \$38.95.

Waste Minimization Audit Report: Case Studies of Minimization of Solvent Wastes and Electroplating Wastes at a DOD Installation

The U.S. EPA's Office of Research and Development is supporting the development and evaluation of a model hazardous waste minimization audit (WMA) procedure. It uses the EPA hierarchy of waste minimization (WM) options, with source reduction being more desirable and recycle/reuse less desirable. Treatment options, although not considered WM, are evaluated if neither of the former alternatives is available. The WMA program has concentrated on ORD's top priority RCRA K and F waste list Audits were conducted at generators of K071 and K106 wastes, K048-K052 wastes, F002-F004 wastes and F006 wastes.

This WMA was carried out at a DOD installation. The audit was aimed at developing WM options for F002, F004, and F006 wastes. For their electroplating facility, three source reduction options and two recycle/reuse options were developed for cadmium/cyanide wastes and two source reduction options for chromium wastes. Implementation of these options could result in EPA delisting of the F006 wastes with a payback period from 4 to 21 months, depending on the choice of options. Savings in F006 waste disposal costs could amount to \$120,000, annually. For their paint stripping solvent facilities, the WMA resulted in two source reduction

options yielding a payback from 6 to 8 months, with savings in waste solvent disposal costs of \$53,000, annually NTIS PB88-166780 \$14.95.

Waste Minimization Audit Report: Case Studies of Minimization of Mercury-Bearing Wastes at a Mercury Cell Chloralkali Plant

This WMA was carried out at two mercury cell chloralkali plants. These audits were aimed at developing WM options for K071 and K106 wastes generated at these plants. The mercury level in the high-volume K071 waste (brine treatment sludge) was too low to permit economical recovery and recycle. However, retorting of the K106 waste (mercury-bearing wastewater treatment sludge) for mercury recovery and recycle is technically feasible. Six source reduction options for the K071 wastes were studied but only one was technically and/or economically feasible. This option was the replacement of mercury cells with the newer membrane cell which is highly capital intensive (\$20 million). Two treatment options were considered for the K071 wastes with their implementation resulting in delisting of the waste, a savings in disposal costs ranging from \$325,000 to \$380,000, and a payback period ranging from 2 to 2.3 years. NTIS PB88-166798 \$19.95.

Waste Minimization in the Printed Circuit Board Industry: Case Studies

The effectiveness of various waste minimization practices or technologies in the printed circuit board and semiconductor manufacturing industries was evaluated. The most significant waste streams in these industries are waste halogenated solvents and metal bearing sludges. This report presents the findings of case studies conducted at five printed circuit board manufacturing facilities and one commercial treatment/recovery facility. Two case studies focus on the recovery of spent halogenated solvents and the remaining four cases discuss the recovery or reduction of metal plating and etching process wastes. Technologies discussed include ultrafiltration, solvent distillation/fractionation, electrolysis, as well as reduction and precipitation. NTIS PB88-161575 \$19.95.

Factors in Assessing the Compatibility of FMLs and Waste Liquids

This project examined various factors in the compatibility of flexible membrane liners (FMLs) with waste liquids and other hazardous substances encountered at waste storage and disposal facilities. Factors examined included the swelling of FMLs and other FML-related compositions in organics, calculation of the solubility parameters of these compositions, distribution of organics between aqueous solutions (e.g. leachates and FMLs), and variables in EPA Method 9090 compatibility testing of FMLs and waste liquids. NTIS PB88-173372 \$19.95.

Treatment Potential for 56 EPA Listed Hazardous Chemicals in Soil

This report provides a quantitative evaluation of the treatment potential in soil for 56 hazardous chemicals, including PAHs, pesticides, chlorinated hydrocarbons, and miscellaneous chemicals. Results of the fate and transport predictions of two mathematical models (RITZ and VIP) were compared with laboratory and literature results in order to evaluate the ability of the models to predict chemical behavior in a soil system. NTIS PB88-174446 \$19.95.

Superfund Remedial Design and Remedial Action Guidance

This document provides assistance to EPA, states, Army Corps of Engineers, and private parties who plan, administer and manage remedial design and remedial action projects, to assure the projects are performed consistently and expeditiously. The document has been organized to reflect the general sequence of events that occurs prior to, during and after remedial design and remedial action at a Superfund site. NTIS PB88-107529 \$18.95.

Field Studies of In Situ Soil Washing

The US EPA and Air Force conducted a research program demonstrating the removal of hydrocarbons from a sandy soil utilizing in situ soil washing. A 50/50 blend of two commercially available surfactants was used to treat compounds with soil adsorption constants (K) between 10 and 1,000,000. Contaminants included dichloromethane, chloroform, 1,1,1-trichloroethane, trichloroethylene, as well as aromatics. Results of the studies showed that the aqueous surfactant solutions were not measurably effective. It is likely that this same ineffectiveness would occur at other chronic spill sites with contaminants possessing high soil sorption values i.e., $K > 1,000$. Finally, use of in situ soil washing would require treatment of the groundwater. NTIS PB88-146808 \$14.95.

REQUEST FOR TECHNOLOGY TRANSFER MATERIAL

PROCESS DESIGN MANUALS

- Phosphorus Removal (Sept. 1987) 1001
- Sludge Treatment and Disposal (Oct 1979) 1011
- Onsite Wastewater Treatment and Disposal Systems (Oct 1980) 1012
- Land Treatment of Municipal Wastewater (Oct. 1981) 1013
- Supplement for Land Treatment of Municipal Wastewater (Oct 1984) 1013a
- Dewatering Municipal Wastewater Sludges (Sept. 1987) 1014
- Municipal Wastewater Stabilization Ponds (Oct. 1983) 1015
- Land Application of Municipal Sludge (Oct. 1983) 1016
- Electrostatic Precipitator Operation and Maintenance (Sept. 1985) 1017
- Odor and Corrosion Control in Sanitary Sewerage Systems and Treatment Plants (Oct. 1985) 1018
- Lime/Limestone FGD Inspection and Performance Evaluation Manual (Oct. 1985) 1019
- Fabric Filter Operation and Maintenance (June 1986) 1020
- Municipal Wastewater Disinfection (Oct 1986) 1021
- Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment (Oct. 1988) 1022

TECHNICAL CAPSULE REPORTS

- First Progress Report: Wellman-Lord SO₂ Recovery Process - Flue Gas Desulfurization Plant 2011
- 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
- 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
- Disposal of Flue Gas Desulfurization Wastes Shawnee Field Evaluation 2028
- Adipic Acid-Enhanced Lime/Limestone Test Results at the EPA Alkali Scrubbing Test Facility 2029
- Benefits of Microprocessor Control of Curing Ovens for Solvent Based Castings 2031

SEMINAR PUBLICATIONS

- Composting of Municipal Wastewater Sludges 4014
- Municipal Wastewater Sludge Combustion Technology 4015
- Permitting Hazardous Waste Incinerators 4017
- Meeting Hazardous Waste Requirements for Metal Finishers 4018

BROCHURES

- Environmental Pollution Control Alternatives Reducing Water Pollution Control Costs in the Electroplating Industry 5016
- Environmental Pollution Control Alternatives Centralized Waste Treatment Alternatives for the Electroplating Industry 5017
- Environmental Pollution Control Alternatives Sludge Handling, Dewatering, and Disposal Alternatives for the Metal Finishing Industry 5018
- Nitrogen Oxide Control for Stationary Combustion Sources 5020
- User's Guide. Emission Control Technologies and Emission Factors for Unpaved Road Fugitive Emissions 5022

HANDBOOKS

- Industrial Guide for Air Pollution Control (June 1978) 6004
- Remedial Action at Waste Disposal Sites (Oct 1985) 6006
- Identification/Correction of Typical Design Deficiencies at Municipal Wastewater Treatment Facilities (Oct. 1982) 6007
- Improving Publicly Owned Treatment Works Performance Using the Composite Correction Program Approach (Oct 1984) 6008
- Septage Treatment and Disposal (Oct 1984) 6009
- Estimating Sludge Management Costs at Municipal Wastewater Treatment Facilities (Oct. 1985) 6010
- Permit Writers Guide to Test Burn Data: Hazardous Waste Incineration (Sept 1986) 6012
- Stream Sampling for Waste Load Allocation Applications (Sept. 1986) 6013
- Control Technologies for Hazardous Air Pollutants (Sept. 1986) 6014
- Underground Storage Tank Corrective Action Technologies (Jan 1987) 6015
- Ground Water (March 1987) 6016
- Retrofitting POTWs for Phosphorus Removal in the Chesapeake Bay Drainage Area (Sept 1987) 6017

INDUSTRIAL ENVIRONMENTAL POLLUTION CONTROL MANUAL

- Waste Minimization Opportunity Assessment (July 1988) 7003

SUMMARY REPORTS

- Control and Treatment Technology for the Metal Finishing Industry Series Sulfide Precipitation 8003
- Sulfur Oxides Control Technology Series FGD Dual Alkali Process 8004
- Sulfur Oxides Control Technology Series FGD Lime/Limestone Processes 8006
- Control and Treatment Technology for the Metal Finishing Industry Series Ion Exchange 8007
- Control and Treatment Technology for the Metal Finishing Industry Series In-Plant Changes 8008
- Sulfur Oxides Control Technology Series FGD Spray Dryer Process 8009
- Fine Pore (Fine Bubble) Aeration Systems 8010
- Technology Assessment of Sequencing Batch Reactors 8011
- Causes and Control of Activated Sludge Bulking and Foaming 8012
- Biomonitoring to Achieve Control of Toxic Effluents 8013
- A Compendium of Technologies Used in the Treatment of Hazardous Wastes 8014

EXECUTIVE BRIEFINGS

- Protecting Health and Safety at Hazardous Waste Sites 9006
- Injection Well Mechanical Integrity 9007

ENVIRONMENTAL REGULATIONS AND TECHNOLOGY PUBLICATIONS

- The Electroplating Industry 10001
- Environmental Regulations and Technology Use and Disposal of Municipal Wastewater Sludge 10003
- Fugitive VOC Emissions in the Synthetic Organic Chemicals Manufacturing Industry 10004
- The National Pretreatment Program 10005

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Forward to: CERL, Technology Transfer, U.S. Environmental Protection Agency, P.O. Box 12505, Cincinnati, OH 45212.

Future Technology Transfer Meetings

Meeting	Title	Date(s)	Location	Contact	Phone No.
Seminar	Leak Detection Methods for Underground Storage Tanks	September 12-13, 1988 September 26-27, 1988 October 27-28, 1988 November 29-30, 1988	San Francisco, CA King of Prussia, PA Atlanta, GA Rosemont, IL	Ursaula Thomas (registration) Carol Grove (content)	215-643-5466 513-569-7362 FTS 684-7362
Seminar	Field Evaluations of Municipal Wastewater Treatment Technologies	December 7-8, 1988 January 9-10, 1989 January 12-13, 1989 January 23-24, 1989 January 26-27, 1989	Schenectady, NY Charlotte, NC Chicago, IL Spokane, WA San Francisco, CA	Karen Natsios (registration) Denis Lussier (content)	617-648-7870 513-569-7354 FTS 684-7354
Workshop	Bioremediation of Hazardous Wastes Sites	To Be Announced	To Be Announced	Fran Kremer	513-569-7346 FTS 684-7346
Workshop	Emerging Technologies for Upgrading Existing or Designing New Drinking Water Treatment Facilities	November 1-2, 1988 November, 1988 February 1989	Boston, MA Chicago, IL Dallas, TX	Jim Smith	513-569-7355 FTS 684-7355
Workshop	Waste Minimization	To Be Announced	To Be Announced	Doug Williams	513-569-7361 FTS 684-7361

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Official Business
Penalty for Private Use \$300

EPA/600/M-88/019

