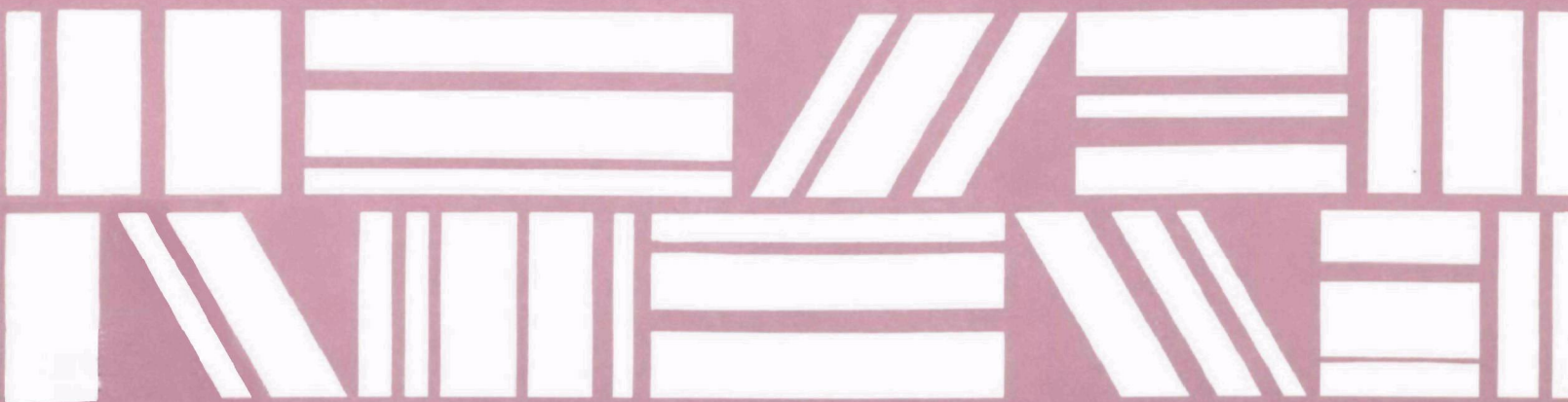




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Quarterly Abstract Bulletin



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QUARTERLY ABSTRACT BULLETIN

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SAMPLE ENTRY

NTIS Order Number/Media Code Price Codes	PB90-120072/HSU PC A09/MF A01
Report Title	Sensitivity of Ecological Landscapes and Regions to Global Climatic Change
Corporate Author	Oregon State Univ., Corvallis
Personal Authors	F. P. Neilson, G. A. King, R. L. DeVelice, J. Lenihan, and D. Marks.
Date	Sep 89
Pages	193p
Report Number	EPA/600/3-89/073
Contract Number	EPA-68-C8-0006 Prepared in cooperation with NSI Technology Services Corp., Corvallis, OR. Sponsored by Corvallis Environmental Research Lab., OR.
Abstract	Increasing awareness of the potential impacts from global climatic change has elicited a storm of research planning among all the major federal agencies. One of the primary difficulties confronted in the planning effort is the need to objectively define clear priorities for research dollars. The report is an attempt to contribute to the process of defining those priorities by scientifically defining specific regions, ecological systems and attributes of those systems that might be particularly sensitive to climatic change. Two approaches to addressing sensitivity have been defined, intrinsic sensitivity and sensitivity relative to a particular stressor. Intrinsic sensitivity is gauged by past variations in different ecosystems. Extrinsic or stressor relative sensitivity addressed the same question, but from the perspective of a particular stress.
Keywords (Descriptors & Identifiers)	*Climatic changes, *Environmental Surveys, *Research projects, Hydrology, Forecasting, Weather, Biological Surveys, Precipitation (Meteorology), Runoff, Natural Resources, Seasonal variations, Biomass, vegetation, Forestry, *Regional Analysis, * Ecosystems, *Global aspects, Federal agencies, Comprehensive planning.

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PB92-131374/REB PC A07/MF A02
Environmental Protection Agency, Washington, DC.
Office of Solid Waste and Emergency Response.
Index to the Monthly Hotline Report Questions
(June 1982 to December 1991).
Booz-Allen and Hamilton, Inc., Bethesda, MD.
Dec 92, 130p EPA/530/SW-91/094
Contract EPA-68-W0-0039
See also PB92-131242 and PB92-131390. Sponsored
by Environmental Protection Agency, Washington, DC.
Office of Solid Waste and Emergency Response.

The document provides four indices to the question and answer sections of the RCRA/Superfund/Oust Monthly Hotline Reports from June 1982 through December 1991. The first index is an alphabetical listing of question titles by year and month. The second index organizes the questions by regulatory citation, beginning with 40 CFR 257. The third index organizes the questions by statutory citation. Finally, the fourth index references the questions by key word or subject heading.

Keywords: *Information management, *Waste management, *Regulations, *Indexes(Documentation), Hazardous materials, Waste disposal, Information retrieval, Superfund, Listings, Toxic substances, Underground storage, Storage tanks, Legal aspects, Public information, *Hotline Reports, Emergency Planning and Community Right-to-Know Act, Resource Conservation and Recovery Act, Office of Underground Storage Tanks.

PB92-169648/REB PC A06/MF A02
Environmental Monitoring Methods Index. Version 1.0 Software. User's Manual.
Environmental Protection Agency, Washington, DC.
Aug 92, 120p EPA/821/B-92/001
See also PB92-503093, PB92-504257 and PB92-504265.

The Environmental Monitoring Methods Index System (EMMI) is an automated inventory of information on environmentally significant analytes monitored by the U.S. Environmental Protection Agency (USEPA) and methods for their analysis. The EMMI System was originally developed in 1985 by Viar and Company and Joel Karnofsky for the USEPA Office of Water Regulations and Standards (OWRS) Industrial Technology Division (ITD) to aid in the selection of appropriate analytical methods for environmental monitoring studies. In November 1990, the Agency selected the EMMI System, then called the List of Lists, for enhancement and distribution throughout EPA to serve as the single authoritative source for cataloguing the Agency's analytical methods. The EMMI database includes information on more than 2800 analytes from 50 regulatory and non-regulatory lists and more than 900 analytical methods. The database provides a comprehensive cross-reference between analytes and analytical methods and contains information on related laws and organizations and additional databases for further information. EMMI is a PC-based system written in System J and will run on IBM and IBM-compatible personal computers. EMMI software is available in a runtime module that allows users to execute the application but does not allow any modification of program or database files. System change control is maintained by the USEPA Office of Water.

Keywords: *Software, *Environmental monitoring, *Indexes(Documentation), *US EPA, *Information retrieval, Users manual, Licenses, Data bases, Printing, Government agencies, Vendors, Test methods, Law enforcement, Standards, Installing, EMMI(Environmental Monitoring Methods Index System), Chemical compounds, Listings, IBM/PC.

PB92-963287/REB PC A01/MF A01
Superfund Accelerated Cleanup Model (SACM).
Volume 1, Number 4, November 1992. Intermittent bulletin.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
Nov 92, 1p OSWER-9203.1-021-VOL-1-NO-4
Paper copy available on Standing Order, deposit account required (minimum deposit \$200, U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The U.S. EPA currently is developing and implementing a streamlined way to clean up hazardous waste sites known as the Superfund Accelerated Cleanup Model, or SACM. It is designed to make the Superfund Program more efficient by cutting years off of cleanups and quickly reducing risks to people and the environment. This bulletin issue provides an overview of the Superfund Accelerated Cleanup Model.

Keywords: *Superfund, *Remedial action, *Mathematical models, *Waste management, Hazardous materials, Implementation, Risk assessment, Regional analysis, Long term effects, Community relations, Public opinion, Law enforcement, *Superfund Accelerated Cleanup Model, *Cleanup operations.

PB92-963289/REB PC A03/MF A01
OSWER Superfund Telephone Directory.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
Dec 92, 42p EPA/540/R-92/027, OSWER-9200.0-03F

Supersedes PB92-963264.
Paper copy available on Standing Order, deposit account required (minimum deposit \$200, U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The report lists telephone numbers of Headquarters and Regional OSWER/Superfund offices and personnel for US EPA.

Keywords: *Hazardous materials, *Telephone sets, *Directories, Telecommunication, Office personnel, Solid waste disposal, Emergencies, *Superfund program, Listings, US EPA 1-10 Regions.

PB92-963377/REB PC A22/MF A04
Hazard Ranking System Guidance Manual. Final interim rept. (Directive).
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
Nov 92, 524p EPA/540/R-92/026, OSWER-9345.1-07

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The Hazard Ranking System Guidance Manual provides general and technical guidance for individuals involved in determining Hazard Ranking System (HRS) scores and preparing HRS scoring packages. The manual clarifies terms and concepts in the HRS, presents strategies and specific guidance for scoring selected HRS factors, and provides guidelines to assist in collecting and organizing relevant data.

Keywords: *Superfund, *Hazardous materials, *Waste management, *Manuals, Guidelines, Site surveys, Ranking, Path of pollutants, Water pollution, Land pollution, Air pollution, Risk assessment, Environmental transport, Remedial action, Data collection, *Hazard Ranking System, *Office of Solid Waste and Emergency Response, National Priorities List, Comprehensive Environmental Response Compensation and Liability Act.

PB92-963618/REB PC A02/MF A01
Superfund at Work: Hazardous Waste Cleanup Efforts Nationwide, Fall 1992. (Valley of the Drums, Bullitt County, Kentucky).
Environmental Protection Agency, Washington, DC.
Office of Solid Waste and Emergency Response.
1992, 8p EPA/520/F-92/006
Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The Superfund program was designed to mitigate the dangers posed by improper disposal of hazardous waste. The A.L. Taylor site, also known as 'Valley of the Drums', was one of the first challenges to Superfund. Valley of the Drums was the scene of one of the largest drum removals in the history of the program. The successful cleanup was accomplished through some notable achievements, including: a significant reduction of risks to local citizens and the environment due to several emergency removal actions; use of state-of-the-art cleanup technologies; combined efforts between the U.S. Environmental Protection Agency (EPA) and the Kentucky Department of Natural Resources and Environmental Protection (KDNREP); and recovery of \$1.8 million of EPA's cleanup costs from polluters. The cooperative effort among EPA, State and local groups culminated in a cleanup of tremendous proportions and a safe community and environment.

Keywords: *Superfund, *Hazardous materials, *Remedial action, *Drums(Containers), *Waste management, State of the art, State government, Kentucky, Cost repayment, Emergency planning, Water pollution control, US EPA, Polychlorinated biphenyls, Heavy metals, Aromatic polycyclic hydrocarbons, Volatile organic compounds, *Bullitt County(Kentucky), *Cleanup operations, Cooperative agreements, Potentially responsible parties.

PB92-963627/REB PC A02/MF A01
Superfund at Work: Hazardous Waste Cleanup Efforts Nationwide, Fall 1992. (American Thermostat Corporation, New York).
Environmental Protection Agency, Washington, DC.
Office of Solid Waste and Emergency Response.
1992, 6p EPA/520/F-92/009

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

EPA's Superfund program decisively mitigated dangerously high levels of toxic chemicals at New York's American Thermostat Corporation (ATC) hazardous waste site. Superfund staff: quickly sampled area drinking wells and treated over 10 million gallons of contaminated ground water; used innovative technologies to reduce on-site soil and ground water contamination; secured a permanent alternate water supply for affected residents; and initiated a public outreach effort which gained support for cleanup activities. The American Thermostat site is a prime example of EPA's commitment to preserve the health and welfare of citizens and the environment.

Keywords: *Hazardous materials, *Remedial action, *Waste management, *Superfund, US EPA, Chemical wastes, Water pollution control, Potable water, New York, Community relations, Chromium, Water supply, Alternatives, Volatile organic compounds, Organic compounds, Arsenic, Lead(Metal), Water pollution sampling, *South Cairo(New York), *Cleanup operations, Innovative treatment technologies, American Thermostat Corporation.

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PB92-963628/REB PC A02/MF A01
Superfund at Work: Hazardous Waste Cleanup Efforts Nationwide, Fall 1992. (Wide Beach Section of Brant, New York).

Environmental Protection Agency, Washington, DC. Office of Solid Waste and Emergency Response. 1992, 8p EPA/520/F-92/010

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

Wide-spread contamination of polychlorinated biphenyls (PCBs) threatened the Wide Beach section of Brant, New York, a popular vacation resort. EPA's Superfund program effectively completed a permanent cleanup of Wide Beach in the span of one year. Other highlights included: a new and innovative technology to remove PCB contamination; reduction of PCBs to one-fifth of acceptable levels; temporary relocation of residents who were concerned for their health while cleanup activities took place; newly paved roads and driveways, re-landscaped yards, and a new storm sewer system; and restoration of ecologically sensitive wetlands. EPA's achievements significantly reduced PCB risks at Wide Beach, and left a satisfied community in Brant.

Keywords: *Superfund, *Remedial action, *Hazardous materials, *Waste management, *Oil spills, Waste oils, Recreation, Polychlorinated biphenyls, Beaches, Wetlands, US EPA, Community relations, Paving, Soil contamination, Water pollution, Wide Beach, New York, *Brant(New York), *Cleanup operations, Innovative treat technologies.

PB92-963629/REB PC A02/MF A01
Superfund at Work: Hazardous Waste Cleanup Efforts Nationwide, Fall 1992. (Krysowaty Farm, Hillsborough, New Jersey).

Environmental Protection Agency, Washington, DC. Office of Solid Waste and Emergency Response. 1992, 6p EPA/520/F-92/011

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The one-acre dump at Krysowaty Farm was small in size compared to some other Superfund sites. But five years of dumping proved to be a challenge when designing an appropriate cleanup. Nevertheless, the U.S. Environmental Protection Agency (EPA) quickly and efficiently alleviated immediate and potential dangers to the community of Hillsborough, New Jersey. In less than five months, Superfund staff: worked closely with community members and Hillsborough Township officials to ensure an effective solution; funded a permanent alternate water supply for residents threatened by contaminated well water; and completed a permanent cleanup of hazardous wastes at the site. Krysowaty Farm is a good example of how an active community, coupled with EPA responsiveness and expertise, can eliminate the dangers posed by the unauthorized dumping of hazardous substances.

Keywords: *Superfund, *Hazardous materials, *Remedial action, *Waste management, Waste disposal, Water pollution, Community relations, Alternatives, Water supply, US EPA, Volatile organic compounds, Pesticides, Polychlorinated biphenyls, New Jersey, *Hillsborough Township(New Jersey), *Cleanup operations.

PB92-963630/REB PC A02/MF A01
Superfund at Work: Hazardous Waste Cleanup Efforts Nationwide, Fall 1992. (Ciba-Geigy Corporation, McIntosh, Alabama).

Environmental Protection Agency, Washington, DC. Office of Solid Waste and Emergency Response. 1992, 6p EPA/520/F-92/017

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

On March 31, 1992, the U.S. Environmental Protection Agency (EPA) reached an agreement with Ciba-Geigy Corporation in McIntosh, Alabama to clean up soil and ground water contaminated by DDT, herbicides, and chemicals. The agreement is one of the largest private party settlements in Superfund history, valued at approximately \$120 million. EPA activities at the site included: conducting preliminary contamination investi-

gations jointly with the Alabama Environmental Health Administration, beginning in 1979; designing a multi-phased cleanup that is responsive to the complex nature of the contamination and reduces potential risk to the local population and environment; and awarding a grant to a community group to help them participate in cleanup decisions. Ciba-Geigy, like EPA, has made consistent efforts to build and maintain good relations with the community. These efforts demonstrate the increasing trend toward cooperation between industries, local communities, and EPA at Superfund sites.

Keywords: *Superfund, *Remedial action, *Waste management, *Hazardous materials, Insecticides, US EPA, DDT, Herbicides, Chemical compounds, Ground water, Water pollution control, Land pollution control, Community relations, Alabama, *McIntosh(Alabama), *Cleanup operations, Settlements, Ciba-Geigy Corporation, Potentially responsible parties, Cooperative agreements.

PB93-100345/REB PC A02/MF A01
RED Facts: Ethylene. Fact sheet.

Environmental Protection Agency, Washington, DC. Office of Pesticide Programs. Sep 92, 6p EPA/540/FS-92/224

EPA is directed by the Federal Insecticide, Fungicide, and Rodenticide Act as amended in 1988 (FIFRA '88) to review all pesticide products containing active ingredients initially registered before November 1, 1984, and to reregister those products that have a substantially complete data base and do not pose unreasonable adverse effects to people or the environment. The pesticide reregistration program is to be completed by the late 1990's. The RED FACTS fact sheet summarizes EPA's conclusion, as set forth in the Reregistration Eligibility Document (or RED), that products containing a pesticide do not pose unreasonable risks when used as directed by Agency-approved labeling, and are eligible for reregistration.

Keywords: *Pesticides, *Toxic substances, *Ethylene, Guidelines, Health hazards, Public health, Herbicides, Growth regulators, Plant growth, Agricultural products, Pest control, Regulations, Ecology, Risk assessment, Labels, *Reregistration, Federal Insecticide Fungicide and Rodenticide Act.

PB93-115822/REB PC A08/MF A02
Environmental Protection Agency, Washington, DC. Office of Ground-Water Protection.

Delineation of Wellhead Protection Areas in Fractured Rocks.

Wisconsin Geological and Natural History Survey, Madison.

K. R. Bradbu, M. A. Muldoon, A. Zaporozec, and J. Levy. Jun 91, 160p EPA/570/9-91/009
See also PB88-111430 and PB93-101111. Sponsored by Environmental Protection Agency, Washington, DC. Office of Ground-Water Protection.

In 1989, the Wisconsin Geological and Natural History Survey prepared the report under an agreement with the Environmental Protection Agency to evaluate methods for wellhead protection area (WHPA) delineation in unconfined fractured-rock aquifers. Two fractured-rock settings were selected for the study: Precambrian crystalline rocks in central Wisconsin and Silurian dolomite in northeastern Wisconsin. The methods tested ranged from simple approaches to complex computer models. Four WHPA delineation approaches are suggested for unconfined fractured-rock aquifers that do not behave as porous media.

Keywords: *Protection, *Water wells, *Water pollution, Guides(Instructions), Hydrogeology, Ground water, Urban areas, Potable water, Technical assistance, Aquifers, Rocks, Fractures, Dolomite, Wisconsin, Safe Drinking Water Act of 1974.

PB93-115897/REB PC A04/MF A01
Environmental Protection Agency, Washington, DC. Office of Drinking Water.

Technical Assistance Document: Corrosion, Its Detection and Control in Injection Wells.

SMC Martin, Inc., Valley Forge, PA.
G. Coker, J. van Es, and J. Hillman. Aug 87, 61p EPA/570/9-87/002

Sponsored by Environmental Protection Agency, Washington, DC. Office of Drinking Water.

The document is intended to summarize information on the occurrence, detection and control of corrosion. It is not intended to establish any regulatory requirements for injection wells. Section I provides a description of the types of corrosion; section II explains inorganic encrustation; Section III gives some representative examples on the effect of corrosion on injection wells; Section IV discusses well corrosion with respect to typical waste fluids and Section V describes the various corrosion control techniques.

Keywords: *Technical assistance, *Injection wells, *Corrosion, *Waste disposal, *Water pollution abatement, Corrosion prevention, Potable water, Ground water, Performance standards, Metals, Design criteria, Pollution regulations, Electrochemistry, Degradation, Plastics.

PB93-116135/REB PC A03/MF A01
Hazardous Waste Management.

Environmental Protection Agency, Washington, DC. Office of International Activities. Sep 91, 20p EPA/600/M-91/031

The report discusses hazardous wastes, their effects on human health and the environment, sampling and analysis methods, and current treatment and disposal technologies. Brochures and associated support material are available on many topics.

Keywords: *Environmental management, *Hazardous materials, *Waste treatment, Potable water, Mining, Waste disposal, Pesticides, Solid waste disposal, Communities, Risk, Pollution prevention, Flow charts, Drinking water.

PB93-131431/REB PC A04/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

SITE-Emerging Technologies: Laser Induced Photochemical Oxidative Destruction of Toxic Organics in Leachates and Groundwaters.

Energy and Environmental Engineering, Inc., Somerville, MA. Research and Development Div. Dec 92, 58p EPA/540/R-92/080
Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

The technology described in the report has been developed under the Emerging Technology Program of the Superfund Innovative Technology Evaluation (SITE) Program to photochemically oxidize organic compounds in wastewater by applying ultraviolet radiation using an excimer laser. The energy supplied by the laser is sufficient to stimulate photochemical reactions between the organics and hydrogen peroxide employed as a chemical oxidant, causing photooxidation and/or phototransformation of the toxic species to carbon dioxide, water and the corresponding halogenated acid. The photochemical reaction is capable of producing the complete destruction of low to moderate concentrations of toxic organics in water. Optimum conditions for the complete destruction of several different classes of compounds were developed and demonstrated in the laboratory.

Keywords: *Water pollution control, *Organic compounds, *Oxidation, *Photochemical reactions, Technology utilization, Hydrogen peroxide, Toxic substances, Ground water, Ultraviolet radiation, Degradation, Leaching, Waste disposal, Hazardous materials, Chemical reactions, *Superfund Innovative Technology Evaluation Program, *Laser induced reactions.

PB93-131449/REB PC A03/MF A01
Atmospheric Chemistry and Physical Fate of HCFCs and HFCs and Their Degradation Products.

Interim rept. Sep 90-Sep 92.
Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.
E. O. Edney. Dec 92, 38p EPA/600/R-92/222

Laboratory experiments were conducted to determine the fate of the proposed CFC substitutes HCFC-22, HCFC-123, HCFC-124, HCFC-141b, HCFC-142b, HFC-125, HFC-134a, and HFC-152a. The program consisted of photochemical oxidation experiments to identify stable oxidation products and measure their yields; deposition studies to measure the extent oxidation products are absorbed into aqueous media; and experiments to determine the fate of hydrolysis prod-

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ucts during droplet evaporation. Model results, obtained using laboratory derived lower limits estimates for aqueous deposition velocities and assuming a well mixed atmosphere, suggest the uptakes rates to cloudwater and oceans are sufficiently fast such that significant buildup of gas phase products is unlikely. The laboratory studies suggest that product accumulation in aqueous media could be affected by losses during evaporation. Direct loss by evaporation of halogenated acids and/or production of volatile compounds after further reactions of the dissolved acids could return halogenated compounds to the atmosphere.

Keywords: *Atmospheric chemistry, *Physical properties, *Environmental chemical substitutes, *Air pollution abatement, Experimental design, Freons, Oxidation, Hydrolysis, Deposition, Precipitation(Meteorology), Halogen organic compounds, Reaction kinetics, Photochemical reactions, Mathematical models, Evaporation, Air water interactions, Oceans, *Hydrochlorofluorocarbons, *Hydrofluorocarbons.

PB93-131456/REB PC A03/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab. **Development of Size-Specific Data from Particulate Control Technology Research Reports.** Final rept. Mar-Sep 92. Pechan (E.H.) and Associates, Inc., Durham, NC. T. A. Dean, M. R. J. Doorn, W. R. Barnard, and R. Coleman. Nov 92, 46p EPA/600/R-92/214 Contract EPA-68-D9-0168 Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The report gives size-specific, uncontrolled emission factors and control efficiencies developed from many studies of particulate control device performance conducted under the direction of EPA's Air and Energy Engineering Research Laboratory (AEERL) between 1974 and 1981. The particle size ranges of concern are 0.25, 2.5-6, 6-10, and 0-10 micrometers. These data and the sampling and analysis procedures documented in the reports were subjected to a quality assurance review and then compared with source- and control-device-specific information in several data sources maintained by EPA's Office of Air Quality Planning and Standards (OAQPS). Where no relevant information existed in these data sources, it was determined that the data developed from these studies should be incorporated into them. Each control device study is reviewed individually. For each study, the source, control device, and sampling configuration are described briefly, the quality of the sampling and analysis methods is rated informally, the data are compared with comparable AP-42 data, and conclusions are drawn regarding the need for the data in the OAQPS data sources. Reviews of documents which yielded data not suitable for inclusion in the OAQPS data sources are also included.

Keywords: *Air pollution control equipment, *Particle size, *Emission factors, *Research, Reviews, Information sources, Pollution sources, Air pollution sampling, Data base management, Performance evaluation, Particle size distribution, Quality assurance, Comparison, Data collection, US EPA, Office of Air Quality Planning and Standards.

PB93-131464/REB PC A04/MF A01
Environmental Protection Agency, Athens, GA. **Evaluation of Source Term Initial Conditions for Modeling Leachate Migration from Landfills.** AQUA TERRA Consultants, Mountain View, CA. L. A. Mulkey, A. S. Donigian, T. L. Allison, and C. S. Raju. Dec 92, 75p Contract EPA-68-03-6304 See also PB83-261099 and PB87-227005. Prepared in cooperation with Computer Sciences Corp., Athens, GA. Sponsored by Environmental Protection Agency, Athens, GA.

Leachate migration modeling is a necessary part of conducting exposure assessments in the development of land disposal regulations for solid wastes. Development of toxicity characteristics to define leachate concentration levels that pose unacceptable risks to humans and the environment requires modeling studies for a wide range of leachate generation-migration scenarios. The study investigated the influence of five alternative modeling initial conditions on down-grad-

ent ground water concentrations predicted by two models (MULTIMED and AT123D) and for four typical hazardous waste constituents. Differences between steady-state and transient conditions also were investigated. The alternative initial conditions studied were shown to be representative of typical leachate patterns reported from laboratory and field studies. The square wave pulse initial condition was found to be the most conservative representation of leachate generation for both models. Sorptive and degradation properties of chemicals strongly influence predictions, and for some chemicals, steady-state modeling and transient modeling of the same scenario produced significantly different results.

Keywords: *Earth fills, *Source terms, *Mathematical models, *Leaching, *Solid waste disposal, *Water pollution, Environmental transport, Land disposal, Pollution regulations, Toxicity, Exposure, Alternatives, Hazardous materials, Steady state, Unsteady flow, Degradation, Sorption.

PB93-131472/REB PC A05/MF A02
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. **Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems: A User's Guide.** Alabama Univ. in Birmingham. Dept. of Civil Engineering. R. Pitt, M. Lalor, D. D. Adrian, R. Field, and D. Barbe. Jan 93, 98p EPA/600/R-92/238 Contract EPA-68-C9-0033 See also PB84-185552. Prepared in cooperation with Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering, and New Orleans Univ., LA. Dept. of Civil Engineering. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

The User's Guide is the result of a series of EPA sponsored research projects to develop a procedure to investigate non-stormwater entries into storm drainage systems. A number of past projects have found that dry-weather flows discharging from storm drainage systems can contribute significant pollutant loadings to receiving waters. If these loadings are ignored (by only considering wet-weather stormwater runoff, for example), little improvement in receiving water conditions may occur with many stormwater control programs. These dry-weather flows may originate from many sources, the most important sources may include sanitary wastewater or industrial and commercial pollutant entries, failing septic tank systems, and vehicle maintenance activities. After the outfalls are identified that are affected by polluted dry-weather flows, additional survey activities are needed to locate and correct the non-stormwater entries into the storm drainage systems. The User's Guide contains information to allow the design and conduct of local investigations to identify the types and to estimate the magnitudes of these non-stormwater entries.

Keywords: *User manuals, *Storm drains, *Storm sewers, *Water pollution control, *Pollution sources, Surveys, Waste water, Runoff, Sewage, Industrial wastes, Septic tanks, Weather, Dry methods, Maintenance, Repair shops, Motor vehicles, Water quality, Permits, Urban runoff, National Pollutant Discharge Elimination System.

PB93-131480/REB PC A03/MF A01
Robert S. Kerr Environmental Research Lab., Ada, OK. **Behavior of Metals in Soils.** Utah Water Research Lab., Logan. J. E. McLean, and B. E. Bledsoe. Oct 92, 27p EPA/540/S-92/018 See also PB88-144167. Sponsored by Robert S. Kerr Environmental Research Lab., Ada, OK.

Metals added to soil will normally be retained at the soil surface. Movement of metals into other environmental compartments, i.e. groundwater, surface water, or the atmosphere, should be minimal as long as the retention capacity of the soil is not exceeded. The extent of movement of a metal in the soil system is intimately related to the solution and surface chemistry of the soil and to the specific properties of the metal and associated waste matrix. The retention mechanisms for metals added to soil include absorption of the metal by the soil solid surfaces and precipitation. In addition to soil properties, consideration must be given to the type of metal and its concentration and to the presence of competing ions, complexing ligands, and the

pH and redox potential of the soil-waste matrix. Because of the wide range of soil characteristics and various forms by which metals can be added to soil, evaluating the extent of metal retention by a soil is site/soil/waste specific. Laboratory methods for evaluating the behavior of metals in soils are available in the literature. Thermodynamic equilibrium computer models are also available to assist with the evaluation. The advantages and disadvantages of some of the available procedures and models have been presented in the document.

Keywords: *Metals, *Environmental transport, *Soil analysis, *Surface chemistry, Land pollution, Waste disposal, Soil science, Thermodynamic equilibrium, Computerized simulation, Chemical properties, Retention, Adsorption, Physical properties.

PB93-131498/REB PC A05/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. **Guidelines for Estimating and Applying Rule Effectiveness for Ozone CO State Implementation Plan Base Year Inventories.** TRC Environmental Corp., Chapel Hill, NC. Nov 92, 84p EPA/452/R-92/010 Contract EPA-68D00121 See also PB92-118017. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.

The guidance describes the procedures developed by the Office of Air Quality Planning and Standards (OAQPS) to estimate the effectiveness of existing regulatory programs to achieve emissions control for stationary sources. One approach is the detailed study protocol developed by the Environmental Protection Agency (EPA) Stationary Source Compliance Division (SSCD) involving on-site inspection and testing on a single source category by source category basis. The second approach, developed by the Air Quality Management Division (AQMD), involves answering generic questionnaires using available file information for specific sources and extrapolating the results to other sources in the same source categories. The third option is to use the 80 percent default for estimating RE. The results of these approaches are to be used to estimate RE for the base year emission inventories being prepared in response to the 1990 CAAA calls for ozone and CO SIP's.

Keywords: *Ozone, *Carbon monoxide, *Pollution regulations, *Air pollution control, *State implementation plans, Guidelines, Performance evaluation, Baseline studies, Standards compliance, Questionnaires, Sources, Volatile organic compounds, Study estimates, Point sources, Procedures, *Emission inventories, *Protocols, Area sources.

PB93-131514/REB PC A03/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. **Column Vapor Extraction Experiments on Gasoline Contaminated Soil.** Camp, Dresser and McKee, Inc., Cambridge, MA. M. E. Miller, T. A. Pederson, C. A. Kaslick, and C. Y. Fan. c1991, 17p EPA/600/A-92/254 Contract EPA-68-03-3409 Pub. in Hydrocarbon Contaminated Soils Proceedings, Amherst, MA., Chapter 26 v11 p437-449, September 23-26, 1991. See also PB92-226430. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

Soil vapor extraction (SVE) is a technique that is used to remove volatile organic compounds from unsaturated soils. Air is pumped from the contaminated area and the chemicals are removed from the resulting vapor stream. In the work laboratory soil column experiments were conducted using a gasoline residually saturated sandy soil to evaluate the performance of SVE under controlled conditions. Both vapor extraction and aqueous leaching of the soil columns were conducted. The progress of the vapor extraction event was continuously monitored by an in-line total hydrocarbon analyzer. Performance of vapor extraction was evaluated by a series of soil chemical analyses including total petroleum, hydrocarbons, headspace measurements, and extraction techniques with quantification by GC/FID and GC/MS. The data is currently undergoing EPA review and no endorsement is implied.

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Keywords: *Land pollution, *Volatile organic compounds, *Soil gases, *Air pollution control, Hydrocarbons, Soils, Monitoring, Leaching, Percolation, Water flow, Gasoline, Risk assessment, Regulations, Sites, Flow diagrams, Soil vapor extraction.

PB93-131522/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Some Emerging Issues in Watershed Management-Landscape Patterns, Species Conservation, and Climate Change. Symposium paper.
Pacific Northwest Forest and Range Experiment Station, Corvallis, OR. Forestry Sciences Lab.
F. J. Swanson, R. P. Neilson, and G. E. Grant. 1992, 37p EPA/600/A-92/256
Pub. in New Perspectives for Watershed Management: Balancing Long-Term Sustainability with Cumulative Environmental Change, Seattle, Washington, November 27-29, 1990. See also PB90-120072. Sponsored by Corvallis Environmental Research Lab., OR.

Emerging issues in watershed management include the need to assess the effects of management activities on the time scale of several cutting rotations (> 100 yrs) and on spatial scales that consider factors impinging from beyond watershed boundaries. Long-range analysis reveals strong, long-lasting effects of landscape patterns created by today's activities. However, the ecological consequences of these patterns may be invisible when the analysis horizon spans only a few decades. Land use decisions within watersheds are increasingly influenced by broader social, economic, and biological factors (e.g., wildlife management plans, such as the Northern Spotted Owl Conservation Strategy). Global climate change poses yet greater potential to alter watershed management schemes. Consequently, improved social and technical tools are needed for planning watershed management of multiple resources in an increasingly uncertain world.

Keywords: *Watershed management, *Forest land, *Landscaping, *Wildlife conservation, *Climatic changes, *Ecology, Hydrology, Forecasting, Global aspects, Long term effects, Regional analysis, Vegetation, Spatial distribution, Biological effects, Species diversity, Pacific Northwest Region(United States).

PB93-131530/REB PC A02/MF A01
Household Exposures to Benzene from Showering with Gasoline-Contaminated Ground Water.
Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.
A. B. Lindstrom, V. R. Highsmith, T. J. Buckley, W. J. Pate, and L. C. Michael. 1992, 8p EPA/600/A-92/259
See also PB87-171278. Prepared in cooperation with North Carolina Dept. of Environment, Health, and Natural Resources, Raleigh, Research Triangle Inst., Research Triangle Park, NC., and Acurex Corp., Research Triangle Park, NC.

In a private residence using benzene contaminated groundwater (about 300 micrograms/l), a series of experiments were performed to assess the benzene exposures that occur in the shower stall, bathroom, master bedroom, and living room as a result of a single 20 minute shower. Sampling methodologies used in the assessment included: fixed site Summa-polished canisters and Tenax GC cartridges; personal Tenax GC devices; and, grab samples collected with glass gas-tight syringes. Integrated Summa and Tenax GC samples were collected from the target microenvironments over 20, 60, and 240 minute periods; these results are contrasted with the long-term personal samples and grab samples that were collected at 0, 10, 18, 20, 25, 25.5, and 30 minutes. Results indicate that maximum benzene concentrations occurred in the shower stall (758-1673 micrograms/cu m) and bathroom (366-498 micrograms/cu m). The total dermal and inhalation dose resulting from a single 20 minute shower was estimated to be equivalent to the inhalation dose which would occur during 6 h of occupation of the house (about 135 micrograms). The benzene dose relating to a single shower and continuous occupancy of the residence was shown to be approximately 551 micrograms/day, with the shower accounting for 25% of the daily total (4% dermal and 21% inhalation), and the remaining 75% relating to respiration in the house for the balance of the day.

Keywords: *Indoor air pollution, *Public health, *Houses, Water pollution effects, Air water interactions, *Benzene, Water utilization, Oil pollution, Gasoline, Ground water, Inhalation, Air pollution sampling,

Exposure, Skin(Anatomy), Underground storage, Storage tanks, Volatile organic compounds, Showers.

PB93-131555/REB PC A03/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Application of Isotherms for Predictions of GAC Performance: A Preliminary Analysis.
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
V. L. Snoeyink, S. Qi, A. Halloran, W. Koffsky, and B. Lykins. 1992, 28p EPA/600/A-92/261
Grant EPA-R-814043
Pub. in Design and Use of Granular Activated Carbon-Practical Aspects. Proceedings (AWWA), Cincinnati, OH., May 9-10, 1989, p43-66. See also PB93-131563. Prepared in cooperation with Jefferson Parish Dept. of Public Utilities, LA. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

An adsorption isotherm can be generally defined as an expression of the equilibrium, at constant temperature, relating the concentration of a species on an adsorbent surface to the concentration in the solution. It has been extensively used for decades to describe adsorption behavior and to estimate the adsorption capacity of activated carbon in various types of processes for removing organics from water. The unique advantages of the technique include ease of preparation and economy of money and time. The possible applications of isotherms may be summarized as (1) to select the best carbon among the alternatives; (2) to estimate the life of carbon in an adsorber; and (3) to test the remaining adsorption capacity of a working activated carbon adsorber. Isotherm capacities can be used directly or by incorporating them into a kinetic model to predict adsorber performance. The paper will focus on the measurement of capacity and its relationship to the measured life of a (GAC) adsorber.

Keywords: *Water pollution control, *Isotherms, *Organic compounds, Performance evaluation, Adsorption, Cost analysis, Organic matter, Water treatment plants, Alternatives, Kinetics, Mathematical models, Potable water, Life(Durability), Reprints, High pressure minicolumns, Jefferson Parish(Louisiana), *Granular activated carbon treatment.

PB93-131563/REB PC A03/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Design for Total Organics Removal at Cincinnati.
Cincinnati Water Works, OH.
J. DeMarco, D. J. Hartman, and D. M. Metz. 1992, 32p EPA/600/A-92/262
Pub. in Design and Use of Granular Activated Carbon, Practical Aspects, Proceedings, May 9-10, 1989, Cincinnati, OH., p399-427. See also PB93-131555, PB83-121731 and PB83-121749. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

The industrial Ohio River is the source water for Cincinnati Water Works' (CWW) California surface water treatment plant. As is true for many industrial rivers, a large number of organic contaminants can be found in trace concentrations in the Ohio River. Many Cincinnati citizens are concerned about the quality of the industrial source water because of the frequent spills and unauthorized discharges that occur each year. Because of citizen and utility manager concerns, granular activated carbon (GAC) research studies were completed at Cincinnati, Ohio. The results of these studies provided the impetus for a full-scale GAC addition to the existing Ohio River Plant. Ground breaking and full construction began on March 16, 1989, for a 175 MGD GAC system that includes downflow, gravity GAC adsorption and on-site multiple hearth reactivation. Completion of the 57.7 million dollar GAC addition is expected by 1992. The GAC plant will provide an additional barrier between the contaminants in the industrial Ohio River water source and the consumers of Cincinnati water. The paper will discuss vital but less publicized data and experiences obtained during the completion of the final design and implementation activities of the CWW.

Keywords: *Water treatment plants, *Organic compounds, *Water pollution control, *Ohio River, Water sources, Public opinion, Water quality, Ohio, Hazardous materials spills, Surface waters, Waste disposal, Implementation, Design, Graphs(Charts), Performance

evaluation, Reprints, *Granular activated carbon treatment, *Cincinnati(Ohio).

PB93-131571/REB PC A03/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Field Experiences VOC and Pesticide Removal Using GAC Suffolk County, New York.
Suffolk County Dept. of Health Services, Hauppauge, NY.
D. Harris, A. Andreoli, and J. H. Baier. 1992, 19p EPA/600/A-92/263
Pub. in Design and Use of Granular Activated Carbon-Practical Aspects. Proceedings, Cincinnati, OH., May 9-10, 1989, p383-394. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

Over the past eight years, Granular Activated Carbon (GAC) systems have been installed for treatment of VOC and pesticides. Several have seen multiple carbon replacement; changes in water quality; and experienced a variety of operational difficulties. The following GAC systems will be discussed: Village of Greenport - one 20,000 lb. GAC operating from 1980 to present for removal of aldicarb and carbofuran; Southold - use of GAC in series for aldicarb, carbofuran and DCP; Dix Hills Water District - three 20,000 lb. units in parallel for removal of DCP; and Suffolk County Water Authority - 4 separate well fields treating aldicarb, DCP, TCA, TCE, PCE and others, with a variety of operating experiences. Operational problems encountered with each unit will also be discussed.

Keywords: *Water treatment, *Volatile organic compounds, *Water pollution control, *Pesticides, *Potable water, Water supply, Water wells, Water quality, Design, Operations, Maintenance, Field tests, New York, Materials replacement, *Suffolk County(New York), *Granular activated carbon treatment.

PB93-131589/REB PC A03/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Reburn Technology for Boiler NOx Control. Rept. for Aug 89-Aug 90.
Combustion Engineering, Inc., Windsor, CT.
R. Borio, R. LaFlesh, R. Lewis, R. Hall, and R. Lott. 1990, 37p EPA/600/A-92/264
Contract EPA-68-02-4280
Presented at Annual Coal Preparation, Utilization, and Environmental Control Contractors Conference (6th), Pittsburgh, PA., August 6-9, 1990. See also PB85-235604, PB89-139695, PB89-139703 and PB89-220529. Prepared in cooperation with Gas Research Inst., Chicago, IL, Electric Power Research Inst., Palo Alto, CA., and Ohio Edison, Akron. Sponsored by Environmental Protection Agency, Research Triangle Park, NC.

The paper reports the progress principally of design-related phases of a demonstration of reburning on a large cyclone-fired boiler, for which coal is the primary fuel and natural gas, the reburn fuel. Reburn system design criteria are presented, as well as the methodology and results of the cold-flow modeling evaluation which was used to identify existing boiler aerodynamics and help to determine the optimum configuration for reburn fuel and additional air injectors. Mathematical modeling was conducted to determine potential effects of a reburn system on boiler thermal performance. Experience is cited regarding effects of low air/fuel stoichiometric conditions on boiler tube wastage. Finally, a current-day economic analysis is presented which is specific to the described demonstration.

Keywords: *Afterburners, *Boilers, *Air pollution control, *Cyclone combustors, *Nitrogen oxides, Design criteria, Performance evaluation, Thermal efficiency, Fuel injection, Combustion products, Natural gas, Coal, Electric utilities, Mathematical models, Aerodynamics, Injection, Economic analysis.

PB93-131597/REB PC A03/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Characterization of Environmental Chambers for Evaluating Microbial Growth on Building Materials. Rept. for Sep 91-Mar 92.
Research Triangle Inst., Research Triangle Park, NC.
K. Foarde, E. Cole, D. VanOsdell, D. Bush, and D. Franke. 1992, 16p EPA/600/A-92/265
Grant EPA-R-817083-01-0

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Presented at ASHRAE Meeting, San Francisco, CA, October 18-21, 1992. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper discusses the use of a static chamber with known environmental conditions to study the ability of microorganisms to grow on a variety of building materials, as a first step in the development of prevention and control strategies for biocontaminants in indoor air quality. A series of preliminary studies utilizing these chambers are presented in the paper and demonstrate the potential value of the static chamber design. Initial experiments have been performed evaluating the effect of relative humidity (RH) on ceiling tile blocks of varying moisture content. The data presented here are preliminary results on the use of these static chambers in assessing the effect of five RHs on the ability of *Penicillium aragonense* to grow on pieces of aged ceiling tile. Blocks in the 97 percent RH chamber with an equilibrium moisture content of about 5 percent yielded an increase of microorganisms by two orders of magnitude within 14 days.

Keywords: *Construction materials, *Indoor air pollution, *Test chambers, *Microorganisms, *Air pollution abatement, Buildings, Humidity, Environmental engineering, Moisture content, Design criteria, Microbiology, *Penicillium aragonense*.

PB93-131613/REB PC A03/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Development of Good Combustion Practice for Municipal Waste Combustors. Rept. for Sep 87-Nov 90.
Energy and Environmental Research Corp., Durham, NC.

J. D. Kilgroe, W. S. Lanier, and T. R. von Alten. 1992, 21p EPA/600/A-92/267.
Contract EPA-68-03-3365
National ASME Waste Processing Conference (15th), Detroit, MI, May 17-20, 1992. See also PB87-208066, PB90-154923, PB90-154931 and PB90-154949.
Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper summarizes the rationale for EPA's good combustion practice (GCP) strategy. The goals of GCP are to maximize furnace destruction of organic pollutants, limit the relative amount of particulate matter (PM) carried out of the combustor with flue gases (PM carryover), and ensure that the PM control device is operated at temperatures that do not result in the formation of excessive amounts of chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans (CDD/CDF). EPA's strategy incorporates three continuous compliance parameters: carbon monoxide (CO) emissions, furnace steam load, and PM control device inlet temperature. Experimental data are provided to show that furnace emission of organics is correlated with CO concentration, the amount of PM carryover (which is related to load), and temperature at the PM control device inlet. The relationships between the GCP compliance parameters and other combustion parameters which are necessary ingredients of good combustion (uniformity of waste feed, the amount and distribution of excess air, combustion temperature and residence time, and mixing of combustion air with thermal decomposition products) are also discussed.

Keywords: *Municipal wastes, *Combustion efficiency, *Combustion chambers, *Waste disposal, *Air pollution abatement, Combustion products, Chlorinated hydrocarbons, Performance evaluation, Compliance, Fly ash, Air pollution sampling, Design criteria, Chlorinated dibenzodioxins, Chlorinated dibenzofurans.

PB93-131621/REB PC A03/MF A01
Evaluating Materials for Healthy Buildings. Rept. for Jan-Jun 92.

Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
B. A. Tichenor. 1992, 14p EPA/600/A-92/268
Presented at the Indoor Air Quality, Ventilation, and Energy Conservation Conference, Montreal, Canada, October 7-9, 1992. See also PB90-110131.

The paper discusses approaches currently used by indoor air quality (IAQ) researchers and practitioners to characterize emissions from indoor materials, including the interaction of these emissions with indoor sinks. Procedures for analyzing chamber test data to

produce emission rates and adsorption/desorption rate constants are discussed, as is the use of these results in IAQ models to predict occupant exposure. Evaluating materials to ensure healthy buildings requires source characterization coupled with exposure assessment.

Keywords: *Environmental effects, *Air pollution control, *Buildings, Materials, Test chambers, Standards, Emission factors, Sampling, Exposure, Public health, Humans, Adsorption, Requirements, Assessments, *Indoor air pollution.

PB93-131639/REB PC A03/MF A01

Gas Research Inst., Chicago, IL.
Applications of Pulse Combustion in Industrial and Incineration Processes.

Sonotech, Atlanta, GA.
B. T. Zinn, B. R. Daniel, and A. B. Rabham. 1991, 15p EPA/600/A-92/269
Contract EPA-DO-0036

Presented at International Gas Research Conference, Orlando, FL, November 16-19, 1992. See also PB91-223289. Sponsored by Gas Research Inst., Chicago, IL, and Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper describes a recently developed approach for using a tunable pulse combustor (PC) to improve the performance of energy intensive industrial processes (e.g., drying, calcining, and incineration) by retrofitting the process with a tunable PC that is operated at a frequency that excites large amplitude resonant pulsations within the process. These pulsations increase the rates of mass, momentum, and heat transfer, which generally increase the productivity and thermal efficiency of energy intensive processes and reduce pollutant emissions from incinerators. The paper presents results showing that recently developed PCs can excite large amplitude beneficial pulsations within small-scale simulations of industrial scale processes. It shows that resonant pulsations increase the productivity and thermal efficiency of water evaporation, and significantly increase the rate of limestone calcination. It discusses results obtained in tests with an EPA rotary kiln incinerator simulator that was retrofitted with a tunable PC.

Keywords: *Air pollution abatement, *Industrial plants, *Incinerators, *Combustion efficiency, Combustion products, Pulsation, Performance evaluation, Mass transfer, Heat transfer, Momentum transfer, Resonant frequency, Soot, Carbon monoxide, Hydrocarbons, Kilns, *Pulse combustion.

PB93-131654/REB PC A02/MF A01

Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Emission Rates of Mercury from Latex Paints.

Acurex Corp., Research Triangle Park, NC.
B. A. Tichenor, Z. Guo, and J. A. Dorsey. 1992, 8p EPA/600/A-92/271
Contract EPA-68-DO-0141

Presented at ASHRAE/CIB Symposium, Healthy Buildings, IAQ 1991, Washington, DC, September 4-8, 1991. See also PB91-223255. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper gives results of tests of latex paints containing organic mercury additives in small environmental test chambers to determine the emission rates of mercury. Five paints were evaluated: two contained phenyl mercuric acetate (PMA); and the other three, different additives. Gypsum wallboard was used as the test substrate. Testing was conducted in the dark and under fluorescent lights to determine if photodegradation of the mercury was occurring. Chamber vapor samples were collected on hopcalite sorbent and analyzed by cold vapor atomic absorption spectroscopy (AAS) to determine total mercury. A mercury monitor, using gold film amalgamation, was also used. Sampling with graphitized carbon sorbents showed that no organic mercury was emitted. The mercury concentration vs. time data were fit with an nth order source emission model. The results of the study showed high initial emission rates followed by slow emissions over an extended period of time. There was no apparent effect of light. The type of additive may affect the emission rates.

Keywords: *Mercury(Metal), *Air pollution sampling, *Latex, *Paints, *Indoor air pollution, *Emission factors, Test chambers, Additives,

Concentration(Composition), Sorbents, Photodegradation, Mercury amalgams, Mercury organic compounds, Decay, Mercuric acetate/phenyl.

PB93-131670/REB PC A03/MF A01
Opportunities for the Use of Geosynthetics in Waste Management Facilities.

Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

R. E. Landreth. 1992, 17p EPA/600/A-92/273
Pub. in International High-Performance Fabrics Conference Proceedings (2nd), Boston, Massachusetts, November 12-13, 1992, p153-166. See also PB88-131263.

The USEPA through its research and field experiences has developed control strategies for hazardous and municipal solid waste landfills and surface impoundments. These control strategies include liner and cover systems. The liner systems include double liners for hazardous waste and a single composite liner for municipal solid waste. The purpose of each individual component will be discussed with options for using natural in-situ materials or geosynthetics. Although natural soils are used as various components, emphasis has been placed on the use of geosynthetics, including geomembranes, geonets, geotextiles, and plastic pipes. Cover systems for both hazardous and municipal waste facilities are based on a multilayer design. The multilayer component characteristics, including performance, thickness, and material type will be discussed. The designs include both natural soils and geosynthetics. It has been demonstrated with field data that the development of construction quality control/quality assurance will improve the performance of the disposal facility. The improved performance of the waste management facility reinforces the confidence of designers as they understand the limits of designing with geosynthetics.

Keywords: *Waste management, *Linings, *Municipal wastes, *Hazardous materials, Pollution control, Quality control, Quality assurance, Earth fills, Design criteria, Surface impoundments, Performance evaluation, Field tests, Experimental design, Environmental protection, US EPA, *Geosynthetic materials, *Land coverings.

PB93-131688/REB PC A03/MF A01

Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Simulation of Nonazeotropic Refrigerant Mixtures for Use in a Dual-Circuit Refrigerator/Freezer with Countercurrent Heat Exchanges.

Maryland Univ., College Park. Dept. of Mechanical Engineering.
J. C. Bare, C. L. Gage, R. Radermacher, and D. S. Jung. 1992, 25p EPA/600/A-92/274
Grant R-817111

Presented at ASHRAE Meeting, Indianapolis, IN, June 23-25, 1991. See also PB90-262833. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper discusses the simulation of Non-azeotropic Refrigerant Mixtures (NARMs) for use in a dual-circuit refrigerator/freezer (RF) with countercurrent heat exchangers. The simulated RF has two complete and independent refrigeration cycles for its two compartments. It uses a NARM in each cycle and countercurrent heat exchangers throughout. In a standard cabinet, the RF is simulated to provide energy savings of 24 percent compared to current U.S. RF designs. The NARMs modeled with the best performance are R-32/-152a, R-32/-142b, and R-22/-142b. An 18 percent improvement can be expected from the dual-circuit system using R-12 alone, and an additional 6 percent improvement can be gained by replacing R-12 with the selected NARMs in countercurrent heat exchangers. Advantages of the system include greatly reduced energy consumption, easy temperature and humidity control for each compartment, no humidity or odors transferred between compartments, and increased time between defrost cycles. Disadvantages include additional hardware requirements, compressor size, and the difficulties of using a NARM.

Keywords: *Refrigerants, *Air pollution abatement, *Environmental chemical substitutes, *Refrigerators, *Computerized simulation, Pollution sources, Heat exchangers, Freezers, Energy consumption, Performance evaluation, Freons, Fluorohydrocarbons, Dual

cycle cooling systems, Chlorohydrocarbons, *Nonazeotropic refrigerant mixtures, Montreal Protocol.

PB93-131696/REB

PC A03/MF A01

Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

Acidic Gases and Aerosols in the Eastern and Western United States.

Environmental Science and Engineering, Inc., Durham, NC.

E. Edgerton, and B. E. Martin. 1992, 11p EPA/600/A-92/275

Contract EPA-68-02-4451

Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

The USEPA National Dry Deposition Network (NDDN) is designed to provide long-term estimates of acidic gas and aerosol concentrations, and associated fluxes, across the continental United States. Inspection of data collected since 1988 shows species-dependent variability in atmospheric concentrations from site to site, season to season and year to year. In general, gas and aerosol concentrations were much higher (factor of 2-10) at eastern sites than western sites. Data for 25 eastern sites operational from 1988 through 1991 suggest that SO₄(-2) concentrations have been essentially constant. In contrast, SO₂ and HNO₃ appear to have decreased, on average, by about 20 percent and 15 percent, respectively. Examination of sub-regional concentration patterns shows marked variability in areas of complex terrain. Data from a ridgetop site and a nearby base elevation site in southwestern North Carolina show that reactive gas concentrations, but not aerosol concentrations, are 2-3 times higher at ridgetop than at base elevation. Elevational gradients thus need to be accounted for in analysis of large-scale concentration patterns.

Keywords: *Aerosols, *Gases, *Acidity, *Air pollution sampling, *Deposition, Long term effects, United States, Concentration(Composition), Graphs(Charts), US EPA, Data base management, Sulfates, Sulfur dioxide, Nitric acid, *Eastern Region(United States), *Western Region(United States), National Dry Deposition Network.

PB93-131704/REB

PC A03/MF A01

Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

Innovative Sensing Techniques for Monitoring and Measuring Selected Dioxins, Furans, and Polycyclic Aromatic Hydrocarbons in Stack Gas.

Radian Corp., Austin, TX.

T. J. Logan, D. P. Dayton, and J. A. Draves. 1992, 17p EPA/600/A-92/277

Contract EPA-68-D1-0010

Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

The U.S. Environmental Protection Agency (EPA) has determined the need to develop in-situ continuous or semi-continuous emissions monitoring (CEM) techniques for assessing dioxin, furan, and polycyclic aromatic hydrocarbon (PAH) emissions from municipal solid waste (MSW) incinerators and other sources. The species have a potential public health risk because of their low associated exposure limits. The paper discusses 12 innovative optical sensing techniques, which were evaluated for application to continuous monitoring approaches. The ability of each of the techniques to function as a CEM system is discussed. Two techniques that appear to have the most potential for successful application are Ultraviolet (UV) Direct Measurement and Fluorescence Measurement. Vapor phase UV spectral data for selected dioxins, furans, and polycyclic aromatic hydrocarbons are being generated to determine limits of detection and assess applicability of the techniques.

Keywords: *Air pollution monitoring, *Continuous sampling, *Optical measuring instruments, *Air pollution detection, *Flue gases, Gas analysis, Waste disposal, Incinerators, Municipal wastes, Methodology, Dioxins, Furans, Aromatic polycyclic hydrocarbons, Ultraviolet spectroscopy, Fluorescence, Concentration(Composition).

PB93-131712/REB

PC A03/MF A01

Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

Comparison of Aerosol Acidity in Urban and Semi-Rural Environments.

Harvard School of Public Health, Boston, MA.

R. M. Burton, W. E. Wilson, P. Koutrakis, and L. J. S.

Liu. May 92, 13p EPA/600/A-92/278

Grant EPA-R-81-6740

Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

During the summer of 1990, acid aerosol, acid gas, and ammonia measurements were conducted simultaneously at three locations in central and western Pennsylvania where population levels were large (metropolitan Pittsburgh) and small (semi-rural communities of Uniontown and State College). Aerosol acidity was found to be lower in the urban area than in the two semi-rural locations. On the contrast, ammonia levels were higher in the urban environment than in the semi-rural environments. Possible sources of ammonia in Pittsburgh are people residing in the city or the two coke plants located upwind of the Pittsburgh sampling site. A mixture of totally and partially neutralized sulfates, i.e., (NH₄)₂SO₄ and NH₄HSO₄, were the dominating sulfur species in Pittsburgh while in State College and Uniontown, the primary sulfur species were H₂SO₄ and NH₄HSO₄.

Keywords: *Air pollution sampling, *Aerosols, *Acidity, Comparison, Hydrogen sulfide, Pennsylvania, Environmental transport, Urban areas, Ammonia, Concentration(Composition), Coking, Ammonium sulfate, Rural areas, Pollution sources, Chemical reactions, Oxidation, Sulfates, Pittsburgh(Pennsylvania), Uniontown(Pennsylvania), State College(Pennsylvania).

PB93-131720/REB

PC A03/MF A01

Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

Inventory of Methane Losses from the Natural Gas Industry. Rept. for Oct 91-Apr 92.

Radian Corp., Research Triangle Park, NC.

M. V. Campbell, L. M. Campbell, and C. E. Burklin.

1992, 18p EPA/600/A-92/279

Contract EPA-68-D1-0031

Presented at Air and Waste Management Association Conference, Kansas City, MO., June 22-26, 1992. See also PB90-182304, PB90-182312 and PB90-182494. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper gives the second year's results of an ongoing 4-year program undertaken jointly by the Gas Research Institute and the U.S. EPA to assess the methane (CH₄) losses from the U.S. natural gas industry. The program's objective is to assess the acceptability of natural gas as a substitute for other fossil fuels for mitigating global climate change. The scope of the program is to directly quantify CH₄ losses from the three major segments of the natural gas industry: production, transmission, and distribution. The study does not address CH₄ emissions from residential, commercial, or industrial end-use sources. The paper covers CH₄ emissions from the gas distribution segment of the natural gas industry.

Keywords: *Methane, *Losses, *Natural gas, *Air pollution control, Fossil fuels, Substitutes, Mitigation, Gas industry, Industrial wastes, Sources, Leakage, Transmission, Production, Spatial distribution, Estimates, Global climate, Stationary sources.

PB93-131738/REB

PC A03/MF A01

Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

Experimental Examination of Integrated Soil Vapor Extraction Techniques. Journal article.

Oregon Graduate Inst. of Science and Technology, Beaverton. Dept. of Environmental Science and Engineering.

R. L. Johnson, W. Bagby, M. Perrott, and C. T. Chen.

c1992, 15p EPA/600/J-92/280

Grant EPA-R-816947

Pub. in Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection, and Restoration, Houston, TX., November 4-6, 1992, p441-452. See also PB88-195184. Spon-

sored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

Soil vapor extraction (SVE) has been shown to be effective at removing hydrocarbons from the unsaturated zone. However, at many spill sites significant fractions of the mass are at or below the water table, in which case SVE is far less effective. To improve its efficiency in cases where gasoline is trapped below the water table, SVE can be used in conjunction with other techniques to get at that trapped mass. In the last few years the direct injection of air into the formation below the water table (i.e., in situ sparging) has become a popular technique. Another approach is to lower the water table to improve air flow in the vicinity of the trapped product. This can be accomplished either in the localized area of a groundwater drawdown cone or as the result of larger scale dewatering. In experiments conducted at the Oregon Graduate Institute (OGI), hydrocarbon spills into a large three-dimensional physical model filled with sand are being used to study the efficiencies of SVE combined with other techniques. Experiments to date have examined SVE operating as a stand-alone technique, as well as in conjunction with air sparging below the water table, dewatering of the 'smear zone' (i.e., where product is trapped as residual below the water table), and air injection into the dewatered smear zone.

Keywords: *Oil spills, *Land pollution control, *Water pollution control, *Hydrocarbons, Ground water, Organic compounds, Injection, Water table, Performance evaluation, Air flow, Petroleum products, Dewatering, Experimental design, Sand aquifers, Aeration, Remedial action, Reprints, *Soil vapor extraction, *Air sparging.

PB93-131779/REB

PC A03/MF A01

Rapid Measurement of Aqueous Hydroxyl Radical Concentrations in Steady-State HO Flux Systems. Journal article.

Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

J. Ireland, and J. Valinikis. c1992, 16p EPA/600/J-

92/402

Pub. in Jnl. Chemosphere, v25 n3 p383-396 1992. Prepared in cooperation with Riga Technical Univ. (Latvia). Faculty of Chemical Technology.

In recent years the hydroxyl radical (HO₂) has become the focus of a significant body of research concerning the chemical oxidation of anthropogenic organic compounds in the environment. The spin-trap compound alpha-(4-pyridyl)-1-oxide-N-tert-butyl-nitron (4-POBN) is utilized for the detection and quantitation of the hydroxyl radical (HO) in aqueous solution. Capillary electrophoresis enables rapid analysis of the probe compound. The thermally unstable HO radical adduct of 4-POBN can be unequivocally identified by gas chromatography / mass spectrometry analysis of its pentafluorobenzyl ether. The minimum steady-state flux of HO₂ is determined in several advanced oxidation systems including photo-Fenton, ozone, and titanium dioxide based radical generators.

Keywords: *Hydroxyl radicals, *Chemical analysis, *Water pollution detection, *Oxidation, *Steady state, Aqueous solutions, Water treatment, Gas chromatography, Mass spectroscopy, Nitrogen organic compounds, Water pollution sampling, Oxidation, Electrophoresis, Reprints, Nitron/(pyridyl-oxide)-N-butyl.

PB93-131795/REB

PC A02/MF A01

Solvent Extraction Processes: A Survey of Systems in the SITE Program. Journal article (Final).

Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

M. C. Meckes, E. Renard, J. Rawe, and G. Wahl.

c1992, 7p EPA/600/J-92/404

Pub. in Jnl. of the Air and Waste Management Association, v42 n8 p1118-1121 Aug 92. Prepared in cooperation with Science Applications International Corp., Cincinnati, OH.

Solvent extraction of contaminated soils, sludges, and sediments has been successfully completed at a number of Superfund sites. Each commercialized process uses a unique operating system to extract organic contaminants from solids. These operating systems may be classified by the properties of the solvents each utilizes: (1) standard solvents, (2) near-critical fluids/liquified gases, and (3) critical solution temperature solvents. The paper discusses pretreatment

and posttreatment requirements, and discusses the operating systems of the solvent extraction system currently in the Superfund Innovative Technology Evaluation (SITE) Program. Future demonstrations of these technologies by the U.S. EPA's Superfund Innovative Technology Evaluation Program will provide additional information regarding the efficacy of these processes. Copyright (c) 1992 Air and Waste Management Association).

Keywords: *Solvent extraction, *Superfund, *Soil treatment, *Waste treatment, *Organic compounds, Requirements, Sludge, Performance evaluation, Sediments, Portable equipment, Reprints, Superfund Innovative Technology Evaluation, Pretreatment processes, Chemical treatment.

PB93-131829/REB **PC A02/MF A01**
Environmental Research Lab., Gulf Breeze, FL.
Periphyton Photosynthesis as an Indicator of Effluent Toxicity: Relationship to Effects on Animal Test Species. Journal article.
Battelle, Columbus, OH.
M. A. Lewis. c1992, 10p EPA/600/J-92/407
Pub. in *Aquatic Toxicology*, v23 p279-288 1992. See also PB89-207013 and PB85-205383. Sponsored by Environmental Research Lab., Gulf Breeze, FL.

The use of freshwater and marine plants in effluent toxicity evaluations is uncommon despite the presence of test methods and recommendations for their use. It has been assumed that aquatic plants are less sensitive than animal test species and consequently, results from toxicity tests with invertebrates and fish have been used often as a surrogate data base. The study evaluated the ability of these animal toxicity tests to provide safe concentrations for in-stream periphyton. The toxicity of several samples of a treated municipal effluent were determined during a five-month period by monitoring short-term changes in periphyton photosynthesis (carbon-14 uptake) and by observing the effects on young production and survival of cultured daphnids and the fathead minnow. The effect levels from the various tests were compared. The effluent was seldom acutely toxic to *Daphnia magna* and the fathead minnow (*Pimephales promelas*) but it was consistently acutely and chronically toxic to *Ceriodaphnia dubia*. Chronic effect levels ranged between 17 and 71% effluent. Significant inhibition and stimulation of periphyton photosynthesis occurred at concentrations of 6 to 39% effluent. Periphyton photosynthesis was a more sensitive effect parameter than animal survival and in some cases than *Ceriodaphnia* reproductive performance. The results indicate that effluent toxicity tests conducted routinely with daphnids and fish may not be sufficient to predict effects on indigenous flora in receiving waters. (Copyright (c) 1992 Elsevier Science Publishers B.V.)

Keywords: *Water pollution effects(Animals), *Toxicity, *Photosynthesis, *Water pollution effects(Plants), Bioassay, Animals, Reproduction(Biology), Reprints, *Periphyton, *Daphnia magna*, *Pimephales promelas*, *Ceriodaphnia dubia*.

PB93-131837/REB **PC A03/MF A01**
Comparison of the Effects of Drilling Fluid on Macrobenthic Invertebrates Associated with the Seagrass, *Thalassia testudinum*, in the Laboratory and Field.
Environmental Research Lab., Gulf Breeze, FL.
D. E. Weber, D. A. Flemer, and C. M. Buidick. c1992, 18p EPA/600/J-92/408, CONTRIB-753
Pub. in *Estuarine Coastal and Shelf Science*, v35 p315-330. See also PB84-223072 and PB87-188140. Prepared in cooperation with University of West Florida, Pensacola. Dept. of Statistics.

The structure of a macrobenthic invertebrate community associated with the seagrass, *Thalassia testudinum*, was evaluated under laboratory and field conditions. The research focused on: (1) the effects of pollution stress from a representative drilling fluid used in offshore oil and gas operations, and (2) a comparison of responses of the seagrass-invertebrate community in the laboratory and field. The numbers of macrobenthic invertebrates were suppressed by drilling fluid at both exposure periods in the laboratory, but inhibitory effects were absent in the field. Invertebrate densities in the field were similar among control and treated plots, and were much lower than densities occurring in the laboratory control. In most instances, species richness values were similar in the field and laboratory at the end of each 6 and 12 week period.

Keywords: *Offshore drilling, *Water pollution effects(Animals), *Marine animals, *Benthos, *Drilling fluids, Santa Rosa Sound, Sea grasses, Experimental design, Field tests, Exposure, Aquatic ecosystems, Biological effects, Biological communities, Florida, Comparison, Reprints, *Thalassia testudinum*.

PB93-131845/REB **PC A03/MF A01**
Robert S. Kerr Environmental Research Lab., Ada, OK.
Exact Peak Capturing and Oscillation-Free Scheme to Solve Advection-Dispersion Transport Equations. Journal article.
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
G. T. Yeh, J. R. Chang, and T. E. Short. c1992, 15p EPA/600/J-92/409
Grant EPA-R-818322
Pub. in *Water Resources Research*, v28 n11 p2937-2951 Nov 92. See also N89-14794. Sponsored by Robert S. Kerr Environmental Research Lab., Ada, OK.

An exact peak capturing and essentially oscillation-free (EPCOF) algorithm, consisting of advection-dispersion decoupling, backward method of characteristics, forward node tracking, and adaptive local grid refinement, is developed to solve transport equations. The algorithm represents a refinement of LEZOOM, developed earlier by the senior author. In LEZOOM, a predetermined number of evenly spaced, hidden nodes was zoomed for a sharp front element, while in the EPCOF scheme, a subset of forwardly tracked nodes is zoomed. The number and location of the subset were automated. As a result, the peaks and valleys are captured exactly; and the ancillary problems of spurious oscillation, numerical dispersion, and phase errors are alleviated. Means of checking accumulated mass balance errors are provided. Application of the algorithm to two one-dimensional benchmark problems under a variety of conditions indicated that it completely eliminated peak clipping, spurious oscillation, phase error, and numerical dispersion. It yielded identical results, within the error tolerance, to exact solutions for all 19 test cases. Accumulated mass balance errors are extremely small for all 19 cases. The EPCOF scheme could solve the advective transport problems exactly, within any prescribed error tolerance, using mesh Peclet numbers ranging from 0 to infinity and very large mesh Courant numbers. (Copyright (c) 1992 by the American Geophysical Union.)

Keywords: *Algorithms, *Advection, *Computational fluid dynamics, *Transport theory, *Ground water, Computational grids, Hydrology, Peclet number, Transport properties, Mathematical models, Dispersing, Reprints.

PB93-131860/REB **PC A03/MF A01**
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Reaction Kinetics of Ca-Based Sorbents with HCl. Journal article Oct 90-Apr 92.
Acurex Environmental Corp., Research Triangle Park, NC.
B. K. Gullett, W. Jozewicz, and L. A. Stefanski. c1992, 13p EPA/600/J-92/411
Contract EPA-68-D0-0141
Pub. in *Ind. Eng. Chem. Res.*, v31 n11 p2437-2446 1992. See also PB89-134142 and PB92-174655. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper gives results of an investigation of the kinetics of the reaction between CaO and HCl under conditions that minimize bulk mass transfer and pore diffusion limitations. Reactivity data from 0.2 to 1 s exposure to 5000 ppm HCl in a fixed-bed reactor were analyzed by a shrinking core model of diffusion and chemical reaction control, either singly or in combination. Between 150 and 350 °C, the reaction is controlled by gaseous diffusion through the developing product layer. The apparent activation energy is about 28.1 kJ/mol (6.7 kcal/mol), and the reaction is first order with respect to HCl concentration. Reactivity is a minor function of the measured particle size and surface area, likely due to the agglomerative nature of the individual grains that comprise the particle structure and complicate the interpretation of these measured values. Extrapolation of these results to the high temperature, furnace sorbent injection process provides preliminary agreement with pilot scale tests. (Copyright (c) 1992 American Chemical Society.)

Keywords: *Hydrogen chloride, *Reaction kinetics, *Sorbents, *Calcium compounds, *Air pollution control, Combustion products, Sulfur dioxide, Mass transfer, Diffusion, High temperature tests, Municipal wastes, Waste disposal, Calcium oxides, Chemical reactions, Reprints.

PB93-131878/REB **PC A03/MF A01**
Techniques for the Fabrication of Geomembrane Filled Seams. Journal article.
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
D. A. Carson, and R. E. Landreth. c1992, 14p EPA/600/J-92/412
Pub. in *Waste Management and Research*, v10 p399-410 1992. See also PB92-188770.

Geomembranes employed to overlay the excavation for landfills must be sealed together at the site of the landfill. To ensure the integrity of the containment system of the landfill, these sheets or blankets must be carefully sealed. The methods in present, common use are extrusion fillet welding whereby the extrudate is placed over the edge of the seam; extrusion flat welding whereby the extrudate is placed between the two sheets to be joined; hot wedge seaming, a thermal fusion bonding, whereby an electrically heated wedge melts the sheets to be joined, after which a roller applies pressure to ensure the seal; hot air seaming whereby hot air between the sheets melt the surfaces to be joined; chemical fusion whereby a liquid chemical is applied between the two sheets to be joined; and chemical adhesive whereby a dissolved bonding agent (adherent) is applied between the two sheets to be joined. (Copyright (c) 1992 ISWA.)

Keywords: *Geotechnical fabrics, *Waste management, *Inspection, *Hazardous materials, *Seaming, Land pollution control, Earth fills, Field tests, Welding, Adhesives, Bonding, Extruding, Reprints, *Geosynthetic materials.

PB93-132587/REB **PC A04/MF A01**
Annual Report of National Park Marine Debris Monitoring Program: 1991 Marine Debris Surveys with Summary of Data from 1988 to 1991. Technical rept.
National Park Service, Washington, DC. Wildlife and Vegetation Div.
C. A. Cole, W. P. Gregg, D. V. Richards, and D. A. Manski. Jul 92, 62p NPS/NRWV/NRTR-92/10, NPS-D-752
See also PB92-158344. Prepared in cooperation with Cape Cod National Seashore, South Wellfleet, MA., Nova Univ. Oceanographic Center, Dania, FL., and Channel Islands National Park, Ventura, CA.

The amount of man-made debris found on beaches and at sea has become a concern in the United States and other parts of the world. Debris washed ashore diminishes the scenic value of beaches, and while adrift at sea can endanger marine wildlife. Of particular concern is plastic debris, which can entangle or be ingested by marine mammals, seabirds, fish, and sea turtles. Through quarterly surveys of established beaches, data is gathered through the National Park Marine Debris Monitoring Program to evaluate marine debris on continental U.S. beaches.

Keywords: *National parks, *Water pollution, *Ocean waste disposal, Land pollution, Surveys, Beaches, Plastics, Damage, Fisheries, Aquatic animals, Mammals, Birds, Turtles, Glass, Ocean currents, *Debris.

PB93-133387/REB **PC A05/MF A01**
Innovative Treatment Technologies: Semi-Annual Status Report (Fourth Edition).
Environmental Protection Agency, Washington, DC. Technology Innovation Office.
L. Fiedler. Oct 92, 87p EPA/542/R-92/011
See also PB92-173210.

The twice yearly report contains site-specific information on Superfund sites (both remedial and emergency response actions) and non-Superfund sites (within the Departments of Defense and Energy) where innovative treatment technologies have been or are being used. Innovative treatment technologies are treatment technologies for which a lack of data on cost and performance makes their selection and use at Superfund sites more difficult. The report documents the use of the following innovative treatment technologies to

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treat ground water in situ, soils, sediments, sludge, and solid-matrix wastes; bioremediation (ex situ), bioremediation (in situ), chemical treatment, dechlorination, in situ flushing, in situ vitrification, soil vapor extraction, soil washing, solvent extraction, thermal desorption, and other technologies.

Keywords: *Hazardous materials, *Waste treatment, *Ground water, *Soils, Water pollution control, Sediments, Sludge, Biological treatment, Extraction, Dechlorination, In-situ processing, Excavation, Tables(Data), Vitrification, Vapors, Flushing, *Superfund, *Remedial action.

PB93-134096/REB PC A09/MF A02
Environmental Protection Agency, Washington, DC. Office of Pollution, Prevention, and Toxics.
Methods for Assessing Exposure to Chemical Substances. Volume 11. Methodology for Estimating the Migration of Additives and Impurities from Polymeric Materials.
Little (Arthur D.), Inc., Cambridge, MA.
A. D. Schwoppe, R. Goydan, and R. C. Reid. Sep 92, 190p EPA/560/5-85/015
Contract EPA-68-D9-0166
See also PB88-129556. Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Sponsored by Environmental Protection Agency, Washington, DC. Office of Pollution, Prevention, and Toxics.

The report contains extensive documentation concerning the migration of additives from polymers to the environment. The additives and monomer residues can migrate from the plastic or elastomer over time. The rate and extent of migration is dependent on many factors such as temperature, the compatibility of the migrant with the polymer, the molecular size of the migrant, the compatibility of the migrant with the phase external to the polymer, and the interactions that may occur between the external phase and the polymer. The Exposure Evaluation Division (EED) of the Office of Pollution Prevention and Toxics is frequently required to assess the potential for exposure to chemicals that are used as additives in polymeric materials or are the monomers or low molecular weight oligomers contained in polymers. The task was undertaken with the objective of developing and documenting a defensible approach to assess the potential for release of chemical additives and reaction residues from polymeric materials. A family of mathematical models was developed and/or adapted for describing the migration of additives to gases, liquids and solids in contact with polymeric materials. In all cases, the user must specify the physical situation.

Keywords: *Polymers, *Environmental transport, *Additives, *Impurity, Public health, Exposure, Study estimates, Migration, Computerized simulation, Diffusion coefficient, Physicochemical properties, Mass transfer, Plastics, Elastomers, Solubility, Air pollution, Water pollution, Partition.

PB93-134344/REB PC A07/MF A02
Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.
Analysis of Potential Trade-Offs in Regulation of Disinfection By-Products.
Miller (Wade) Associates, Inc., Arlington, VA.
J. E. Cromwell, X. Zhang, S. Regli, and B. MacIer. Nov 92, 129p EPA/811/R-92/008
Sponsored by Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.

Executive Order 12291 requires the preparation of a Regulatory Impact Analysis (RIA) on all new major federal regulations. The goal of an RIA is to develop and organize information on benefits, costs, and economic impacts so as to clarify trade-offs among alternative regulatory options. This paper outlines explicit methodology for assessing the technical potential for risk-risk tradeoffs. The strategies used to cope with complexities and uncertainties in developing the Disinfection By-Products Regulatory Analysis Model are explained. Results are presented and discussed in light of uncertainties, and in light of the analytical requirements for regulatory impact analysis.

Keywords: *Disinfection, *Water pollution abatement, *Water treatment, *Regulations, *Byproducts, *Potable water, Disinfectants, Water quality, National government, Microorganisms, Compliance, Public health, Exposure, Risk assessment, Alternatives, Assessments, Tables(Data), Graphs(Charts), *Regulatory

Impact Analysis, Disinfection By-Products Regulatory Analysis Model.

PB93-134351/REB PC A05/MF A01
Draft Ground-Water Disinfection Rule.
Environmental Protection Agency, Washington, DC. Office of Solid Waste.
Jul 92, 83p EPA/811/P-92/001

The document presents possible ground water disinfection requirements and solicits comments from the public.

Keywords: *Disinfection, *Ground water, *Requirements, *Water pollution abatement, Describing, State agencies, Public opinion, Objective, US EPA, Design criteria, Growth, Viruses, Bacteria, Operations, Rules.

PB93-134369/REB PC A05/MF A01
Framework for Decision Making: An EPA Perspective.
Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.
S. Regli, J. E. Cromwell, X. Zhang, A. B. Gelderloos, and W. D. Grubbs. Aug 92, 82p EPA/811/R-92/005

The United States Environmental Protection Agency (EPA) is developing national regulations to control for disinfectants and disinfection by-products (D/DBPs) in public drinking water supplies. EPA intends to propose regulations that will apply to all public water systems using disinfection and serving non-transient populations -- approximately 220 million people. This regulation would be unlike the current maximum contaminant level (MCL) for total trihalomethanes (TTHMs) which only pertains to systems serving more than 10,000 people. A fundamental goal in setting any new regulation is to be able to conclude with confidence that the resultant changes in treatment would lead to a significant overall decrease in risk to public health. This paper will describe the analysis that EPA is undertaking in pursuit of meeting this goal.

Keywords: *Pollution regulations, *Water pollution abatement, *Potable water, *Water treatment, *Disinfection, Disinfectants, Byproducts, Decision making, US EPA, Management planning, Compliance, Environmental chemical substitutes, Risk assessment, Best technology, Water quality management, Distribution systems, Public health, Halomethanes, Mathematical models, Maximum Contaminant Levels, Safe Drinking Water Act.

PB93-134377/REB PC A04/MF A01
Environmental Protection Agency, Washington, DC.
Occurrence Assessment for Disinfectants and Disinfection By-Products (Phase 6a) in Public Drinking Water. Final rept.
Miller (Wade) Associates, Inc., Arlington, VA.
3 Aug 92, 55p EPA/811/R-92/003
Contract EPA-68-CO-0069
Sponsored by Environmental Protection Agency, Washington, DC.

The EPA Office of Ground Water and Drinking Water is developing national primary drinking water regulations for disinfectant and disinfection by-product contaminants. Thirteen contaminants are being considered to be regulated under Phase 6. These contaminants, referred to as Phase 6a, are the subject of the report. The information is important for setting the Maximum Contaminant Level Goal for a contaminant. The exposure information also is used to estimate the 'baseline' health impact assessment of current levels and for evaluation of the health benefits of the regulatory alternatives.

Keywords: *Potable water, *Disinfectants, *Regulations, *Public health, Water treatment chemicals, Byproducts, Disinfection, Water supply, Surveys, Risk assessment, Estimates, Economic impact, Bromates, Chlorine organic compounds, Bromine inorganic compounds, Chloroform, Distribution systems, Concentration(Composition), Ground water, *Drinking water, Best Available Technology, Acetic acid/Dichloro.

PB93-134385/REB PC A03/MF A01
Simulation of Compliance Choices for the Disinfection By-Products Regulatory Impact Analysis.
Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.

A. B. Gelderloos, G. W. Harrington, D. M. Owen, S. Regli, and J. K. Schaefer. 1992, 33p EPA/811/R-92/002
See also PB90-148016. Prepared in cooperation with Pirnie (Malcolm), Inc., White Plains, NY., North Carolina Univ. at Chapel Hill, and Miller (Wade) Associates, Inc., Arlington, VA.

The U.S. EPA is in the process of developing regulations designed to limit the concentrations of disinfectants and their by-products in drinking water systems. The objective of regulatory analysis is to determine the potential impacts of implementing different regulatory options. This paper describes one aspect of this analysis.

Keywords: *Disinfection, *Byproducts, *Water treatment, *Water pollution abatement, *Potable water, *Regulations, Compliance, Implementation, US EPA, Concentration(Composition), Microorganisms, Public health, Water quality, Mathematical models, Toxicity, *Regulatory Impact Analysis, Maximum Contaminant Level, Surface Water Treatment Rule.

PB93-134393/REB PC A05/MF A02
Simulation of Microbial Occurrence, Exposure and Health Risks after Drinking Water Treatment Processes.
Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.
W. D. Grubbs, B. A. MacIer, and S. Regli. 1992, 98p EPA/811/R-92/007

For the development of the Disinfectant/Disinfection Byproduct Rule, EPA wishes to compare human health risks from microbial infection with those from chemical disinfectants and their byproducts. EPA is approaching the problem with the use of computer models that simulate occurrence levels of pathogenic organisms in raw water, then simulate disinfection and production of disinfection byproducts. The microbial and chemical concentrations thus generated are then used to estimate potential health risks. The paper presents the methodology used for these simulations and estimations and discusses the assumptions and uncertainties inherent to the modeling process.

Keywords: *Risk assessment, *Public health, *Water treatment, Mathematical models, Disinfection, Microorganisms control(Water), Disinfectants, Byproducts, Concentration(Composition), Giardia, Comparison, Estimates, Computerized simulation, US EPA, Exposure, *Drinking water.

PB93-134401/REB PC A03/MF A01
Simulation of Raw Water and Treatment Parameters in Support of the Disinfection By-Products Regulatory Impact Analysis.
Environmental Protection Agency, Washington, DC. Office of Drinking Water.
S. Regli, J. Cromwell, J. Mosher, and X. Zhang. 10 Jun 92, 50p EPA/811/R-92/001

The U.S. EPA has undertaken an effort to model how the water supply industry may respond to possible rules and how those responses may affect human health risk. The model is referred to as the Disinfection By-Product Regulatory Analysis Model (DBPRAM). The paper is concerned primarily with presenting and discussing the methods, underlying data, assumptions, limitations and results for the first part of the model. This part of the model shows the creation of sets of simulated water supplies that are representative of the conditions currently encountered by public water supplies with respect to certain raw water quality and water treatment characteristics.

Keywords: Disinfectants, Byproducts, *Regulations, *Water treatment, *Mathematical models, Potable water, Regression analysis, Water pollution, Risk assessment, Water pollution abatement, Simulation, Water supply, Filtration, Water softening, Raw water.

PB93-134419/REB PC\$29.00/MF A04
Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders.
Environmental Protection Agency, Washington, DC. Office of Health and Environmental Assessment.
Dec 92, 535p EPA/600/6-90/006F
See also PB90-261652 and PB92-182344.

The report addresses the weight of evidence on the potential associations between passive smoking or environmental tobacco smoke (ETS) and (1) lung cancer in nonsmoking adults, and (2) noncancer respiratory disorders, primarily in children. With respect to lung cancer, the report concludes that (1) ETS is causally associated with lung cancer in nonsmoking adults and is an EPA Group A (known human) carcinogen, and (2) approximately 3,000 lung cancer deaths per year among nonsmokers of both sexes in the United States are attributable to ETS. With respect to noncancer respiratory effects, the report concludes that ETS exposure to children from parental smoking is causally associated with (1) respiratory symptoms of irritation (cough, sputum, and wheeze); (2) middle ear effusion; (3) reduced lung function; (4) lower respiratory tract infections (LRI), particularly in infants; and (5) additional episodes and increased severity of asthma in asthmatic children. The evidence also suggests that ETS exposure induces asthma in previously asymptomatic children. In addition, passive smoking causes some respiratory discomfort and reduced lung function in adults.

Keywords: *Tobacco smoke pollution, *Environmental health, *Lung neoplasms, *Respiratory diseases, *Smoking, *Tobacco, *Epidemiologic factors, *Adults, *Children, *Passive smoking.

PB93-134674/REB PC A05/MF A01
Corvallis Environmental Research Lab., OR.
Quality Assurance Plan for 1991 Pilot Study of the Ecological Condition of Municipal Wastewater Constructed Wetland Treatment Systems.
White (J.D.) Co., Vancouver, WA.
A. D. Sherman, and L. S. McAllister. Dec 92, 96p EPA/600/R-92/231
See also PB93-134682, PB89-220503, PB89-143028 and PB84-191626. Prepared in cooperation with Man-Tech Environmental Technology, Inc., Corvallis, OR. Sponsored by Corvallis Environmental Research Lab., OR.

The purpose of the quality assurance plan is to detail the methods and procedures to be used in the pilot study of the ecological condition in municipal wastewater constructed wetland treatment systems. It includes specific procedures for assuring that data are of known, high quality. Background material and description of the general approach are outlined in a separate project work plan.

Keywords: *Ecology, *Sewage treatment, *Municipalities, *Water quality management, *Wildlife, *Water pollution control, *Quality assurance, *Habitats, *Sampling, *Toxicity, *Vegetation, *Auditing, *Birds, *Invertebrates, *Wetlands, *Pilot study.

PB93-134682/REB PC A04/MF A01
Corvallis Environmental Research Lab., OR.
Quality Assurance Field Operations Report for the Pilot Study Evaluating the Habitat Value of Wetland Treatment Systems.
ManTech Environmental Technology, Inc., Corvallis, OR.
L. S. McAllister. Dec 92, 66p EPA/600/R-92/230
See also PB93-135614. Sponsored by Corvallis Environmental Research Lab., OR.

The use of wetland treatment systems (WTS), or constructed wetlands, for treating municipal wastewater is increasing in the United States, but little is known about the ability of these systems to duplicate or sustain wetland functions. The purpose of the field operations report is to document field methods and activities as they were conducted during the 1991 field season. The report includes details of sampling procedures, criteria used for making sampling decisions, data that were collected at each site, and analysis of quality control data, and a discussion of difficulties encountered. The field operations report will cover only the field work pertaining to compiling data on selected indicators of wetland condition by taking measurements at sites and utilizing the Wetland Evaluation Technique (WET), to evaluate habitat quality and other values of WTS and to assess the technique's utility for WTS evaluation.

Keywords: *Sewage treatment, *Municipalities, *United States, *Field tests, *Wildlife, *Habitats, *Construction, *Quality assurance, *Sampling, *Measurement, *Indicator species, *Abundance, *Invertebrates, *Plants(Botany), *Aquatic animals, *Performance evaluation, *Wetlands.

PB93-134872/REB PC A03/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
User's Guide to Flexible Membrane Liner Advisory Expert System: Flex Version 3.0. User manual.
Computer Sciences Corp., Cincinnati, OH.
T. Adams, and J. McCready. Dec 92, 32p EPA/600/C-92/006, EPA/SW/DK-93/029A
Contract EPA-68-WO-0043
For system on diskette, see PB93-502631. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

The guide is a user manual for the Flexible Membrane Liner Advisory Expert System (FLEX). The system assists in determining if a proposed synthetic liner material will be chemically resistant to a proposed or anticipated leachate from a hazardous waste land disposal site. More specifically, it analyzes EPA required physical property test data (Method 9090) and provides textual advice about data adequacy and specific indicators that a liner may not be chemically resistant.

Keywords: *User manuals(Computer programs), *Expert systems, *Solid waste disposal, *Hazardous materials, *Membranes, *Linings, *Documentation, *Chemical resistance, *Performance standards, *Land pollution control, *Materials tests, *Compatibility methods, *Physical properties, *Leaching, *Flexible Membrane Liner Advisory Expert System, EPA method 9090, *Geomembranes, *Geosynthetic materials.

PB93-134898/REB PC A03/MF A01
Status Report on Analytical Methods to Support the Disinfectant/Disinfection By-Products Regulation.
Environmental Protection Agency, Washington, DC.
Office of the Assistant Administrator for Water.
Aug 92, 18p EPA/811/R-92/004

The U.S. EPA is developing national regulations to control disinfectants and disinfection by-products in public drinking water supplies. Twelve disinfectants and disinfection by-products are identified for possible regulation under this rule. The document summarizes the analytical methods that EPA intends to propose as compliance monitoring methods. A discussion of surrogate measurements that are being considered for inclusion in the regulation is also provided.

Keywords: *Disinfectants, *Disinfection, *Byproducts, *Regulations, *Potable water, *Compliance, *Monitoring, *Water pollution abatement, *Water pollution monitors, *Water policy, *Water treatment, *Chemical analysis.

PB93-134906/REB PC A05/MF A01
Status Report on the Development of Draft MCLGs for Disinfectants and By-Products.
Environmental Protection Agency, Washington, DC.
Office of the Assistant Administrator for Water.
Oct 92, 81p EPA/811/R-92/008

The Maximum Contaminant level goals (MCLG) are set at concentration levels at which no known or anticipated adverse health effects occur, allowing for an adequate margin of safety. Establishment of an MCLG for each specific contaminant depends on the evidence of carcinogenicity from drinking water exposure or the Agency's oral reference dose based on noncarcinogenic data. The report discusses the status of the development of draft MCLG5 for disinfectants and disinfection by-products.

Keywords: *Potable water, *Disinfectants, *Public health, *Water pollution abatement, *Disinfection, *Byproducts, *Dosage, *Carcinogens, *Humans, *Populations, *Chlorine, *Ions, *Hydrolysis, *Sodium hypochlorite, *Risk assessment, *Exposure, *Air pollution, *Drinking water, *Chlorine gas.

PB93-134914/REB PC A03/MF A01
Status Report on Development of Regulations for Disinfectants and Disinfection By-Products.
Environmental Protection Agency, Washington, DC.
Office of the Assistant Administrator for Water.
Jun 91, 44p EPA/570/9-91/040

The purpose of this document is to indicate the status of regulation development for the disinfectants (Ds) and disinfection by-products (DBPs) and to solicit feedback from the public. Previously, EPA made available to the public a 'strawman' rule (October 1989)

and a conceptual framework for developing these regulations (December 1990). This document reflects EPA's current thinking on how the criteria for the D/DBP regulations are evolving. The document consists of four sections: (1) overview of anticipated general requirements of the rule and major issues, (2) fact sheet on the status of pertinent analytical methods, (3) fact sheet on the status of health effects information, and (4) draft compliance monitoring requirements.

Keywords: *Water pollution abatement, *Regulations, *Disinfectants, *Water treatment, *Disinfection, *Potable water, *Byproducts, *Public opinion, *US EPA, *Requirements, *Public health, *Compliance, *Water pollution sampling, *Risk assessment, *Chemical compounds, *Toxicity, *Safe Drinking Water Act, *Maximum Contaminant Level.

PB93-134922/REB PC A03/MF A01
Environmental Protection Agency, Washington, DC.
Criteria and Standards Div.
Technologies and Costs for Control of Disinfection By-Products: Executive Summary.
Pirnie (Malcolm), Inc., White Plains, NY.
Nov 92, 21p EPA/811/S-92/002
Sponsored by Environmental Protection Agency, Washington, DC. Criteria and Standards Div.

The document characterizes the feasibility of treatment for disinfection by-products control and estimates the costs for treatment alternatives that can then be used by utilities to meet national regulations. Treatment criteria are developed through the use of a water treatment simulation model for parameters critical to disinfection by-products control.

Keywords: *Disinfectants, *Disinfection, *Byproducts, *Cost analysis, *Water pollution control, *Water pollution abatement, *Potable water, *Regulations, *Cost estimates, *Models, *Simulation, *Economic impact, *Economic factors, *Best available technology, *Water treatment plants.

PB93-134930/REB PC A03/MF A01
Use of Microbial Risk Assessment in Setting U.S. Drinking Water Standards.
Environmental Protection Agency, Washington, DC.
Office of the Assistant Administrator for Water.
B. A. Macier, and S. Regli. Oct 92, 15p EPA/811/S-92/001

The paper outlines the U.S. EPA's general strategy for using microbial risk assessment to support the development of the National Primary Drinking Water Regulations. It discusses specifically the use of such risk assessment in the development of upcoming regulations for disinfection of groundwater and for control of disinfectants and their chemical byproducts, and possible amendments to the current Surface Water Treatment Rule.

Keywords: *Potable water, *Risk assessment, *Microbial degradation, *Public health, *Water quality standards, *Water treatment, *Pathogens, *Health hazards, *Microorganism control(Water), *Bacterial diseases, *Regulations, *Disinfectants, *Byproducts, *Water pollution abatement, *Giardia, *Giardiasis, *Drinking water, *Surface water.

PB93-134948/REB PC A06/MF A02
Environmental Protection Agency, Washington, DC.
Office of the Assistant Administrator for Water.
Water Treatment Plant Simulation Program, Version 1.21, User's Manual.
Pirnie (Malcolm), Inc., White Plains, NY.
Jun 92, 119p EPA/811/B-92/001
Sponsored by Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.

The User's Manual for Version 1.21 of the Water Treatment Plant Simulation Program has been prepared to provide a basic understanding of (1) how to operate the program, and (2) the underlying assumptions and equations that are used to calculate the removal of natural organic matter and the formation of disinfection by-products. The manual represents the first public release of the program.

Keywords: *Disinfection, *Water treatment, *Water pollution control, *Users manual, *Organic matter, *Mathematical models, *Byproducts, *Computerized simulation.

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tion, Requirements, Disinfectants, Chlorine organic compounds, Sedimentation, Flocculation, Flow charts, Fluid filtration, Water quality, Profiles, Tables(Data), *Water treatment plants, Trihalomethane, Methane/trichloro, IBM/PC computers, Chemicals.

PB93-135614/REB PC A06/MF A02
Corvallis Environmental Research Lab., OR.
Habitat Quality Assessment of Two Wetland Treatment Systems in Mississippi: A Pilot Study. ManTech Environmental Technology, Inc., Corvallis, OR.
L. S. McAllister. Dec 92, 105p EPA/600/R-92/229
See also PB93-134675, PB92-111566 and PB91-113837. Sponsored by Corvallis Environmental Research Lab., OR.

The use of wetland treatment systems (WTS), or constructed wetlands, for treating municipal wastewater is increasing in the United States, but little is known about the ability of these systems to duplicate or sustain wetland functions. The pilot study was designed to examine methods and the usefulness of various wetland indicators for assessing the wildlife habitat quality in six WTS sites throughout the United States. The report focusses on two Mississippi sites, one located near Collins, and one near Ocean Springs.

Keywords: *Wetlands, *Habitats, *Sewage treatment, *Biological effects, Biological indicators, United States, Mississippi, Wildlife, Ecosystems, Birds, Hydrology, Toxicity, *Created wetlands, *Wetland treatment systems, Collins(Mississippi), Ocean Springs(Mississippi).

PB93-135622/REB PC A05/MF A01
Corvallis Environmental Research Lab., OR.
Effects of UV-B and Global Climate Change on Rice: First Annual Program Progress Report. D. M. Olszyk, D. Bachelet, S. Holmann, K. Fisher, and K. L. Heong. Dec 92, 95p EPA/600/R-92/241
See also PB91-109983 and PB90-263971. Prepared in cooperation with ManTech Environmental Technology, Inc., Corvallis, OR., and International Rice Research Inst., Los Banos, Laguna (Philippines).

The document describes the first year of research by the Rice Research Program conducted cooperatively at the Environmental Research Laboratory in Corvallis (ERL-C), Oregon, USA; and the International Rice Research Institute (IRRI) at Los Banos, the Philippines. It covers the period of 1 October, 1990 through 30 September, 1991. The first year of the program saw significant accomplishments in setting up the administrative framework for the program, refining the research objectives, and initiating the research. However, this was only the beginning. The next four years of the project will include intensive modeling and research activities to assess the effects of UV-B radiation and global climate change on rice productivity.

Keywords: *Ultraviolet radiation, *Rice plants, *Terrestrial ecosystems, *Climatic changes, Carbon dioxide, Plant ecology, Project planning, Mathematical models, Graphs(Charts), Yield.

PB93-135630/REB PC A08/MF A02
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
Arctic Contaminants Research Program: Research Plan. Corvallis Environmental Research Lab., OR.
D. H. Landers, J. Ford, S. Allen, L. Curtis, and J. M. Omernik. Dec 92, 164p EPA/600/R-92/210
See also PB91-137109 and AD-P007 273. Prepared in cooperation with ManTech Environmental Technology International, Inc., Corvallis, OR. Sponsored by Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.

The research plan was initially intended to contain the information needed to evaluate the U.S. Environmental Protection Agency (EPA) Arctic Contaminant Research Program (ACRP). The scientific aspects of the proposed research form the main body of the document and focus on objectives of the specific research components, current literature, approach, and rationale. The ACRP has three major components: (1) extensive sampling of lichens, mosses, and soils to provide a spatial understanding of the status and extent of contaminants present in arctic ecosystems, (2) lake sediment research to evaluate the source and history of arctic contaminant inputs, and (3) food web re-

search to evaluate the possible effects of atmospherically transported pollutants on arctic food webs. The research plan will be used to provide a framework for the ACRP, based on the preliminary studies done to date and will be implemented over the next five years. The Program will undergo additional peer reviews at two-year intervals in the future.

Keywords: *Ecosystems, *Sediments, *Food web, *Arctic regions, *Pollutants, Land pollution, Water pollution, Environmental transport, Environmental surveys, Spatial distribution, Soil analysis, Lichens, Mosses, Air pollution effects(Plants), US EPA, Plants(Botany), *Arctic Contaminants Research Program.

PB93-135648/REB PC A09/MF A02
Environmental Research Lab.-Duluth, MN.
Water Temperature Characteristics of Lakes Subjected to Climate Change. Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
M. Hondzo, and H. G. Stefan. Dec 92, 181p EPA/600/R-92/244
Grant EPA-R-816230
See also PB93-135655, PB92-121391 and PB81-218349. Sponsored by Environmental Research Lab.-Duluth, MN.

A deterministic, one dimensional, unsteady lake water temperature model was modified and validated to simulate the seasonal (spring to fall) temperature stratification structure over a wide range of lake morphometries, trophic and meteorological conditions. Model coefficients related to hypolimnetic eddy diffusivity, light attenuation, wind sheltering, and convective heat transfer were generalized using theoretical and empirical extensions.

Keywords: *Water temperature, *Lakes, *Climatic changes, *Air water interactions, *Computerized simulation, Seasonal variations, Meteorology, Heat transfer, Stratification, Convection, Attenuation, Wind(Meteorology), Hydrology, Eddies, Water quality, Biological effects, Thermal stratification.

PB93-135655/REB PC A07/MF A02
Environmental Research Lab.-Duluth, MN.
Relationship between Water Temperatures and Air Temperatures for Central U.S. Streams. Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
E. B. Preud'homme, and H. G. Stefan. Sep 92, 146p EPA/600/R-92/243
Grant EPA-R-816230
See also PB93-135648 and PB81-218349. Sponsored by Environmental Research Lab.-Duluth, MN.

An analysis of the relationship between air and stream water temperature records for 11 rivers located in the central United States was conducted. The reliability of commonly available water temperature records was shown to be of unequal quality. Simple linear relationships between air (T sub a) and water (T sub w) temperatures were developed for daily and weekly average temperatures and showed some level of accuracy, especially for weekly average temperatures and for small streams. The general equations $T_{sub w} = 5.0 + 0.75 (T_{sub a})$ and $(T_{sub w}) = 2.9 + 0.86 (T_{sub a})$ simulated the daily and weekly temperatures of the 11 streams studied with a standard deviation between measurements and prediction of 2.7 C and 2.1 C, respectively. Predictions were better for shallow streams than for deep streams. Periods of ice cover were excluded from the analysis.

Keywords: *Streams, *Temperature measurement, *Water pollution, *Atmospheric temperature, Monitoring, Mathematical models, Climatic changes, Shallow water, Diurnal variations, Correlation, Ice reporting.

PB93-135663/REB PC A07/MF A02
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Revised Emissions Estimation Methodologies for Industrial, Residential, and Electric Utility Stationary Combustion Sources. Final rept. Oct 91-Sep 92. TRC Environmental Corp., Chapel Hill, NC.
D. Bowman, S. Lowe, D. Winkler, and D. Zimmerman. Dec 92, 141p EPA/600/R-92/239
Contract EPA-68-D9-0173
See also PB92-126945 and DE86003135. Sponsored by Environmental Protection Agency, Research Tri-

gle Park, NC. Air and Energy Engineering Research Lab.

The report describes the development of improved and streamlined EPA emission estimation methods for stationary combustion area sources by the Joint Emissions Inventory Oversight Group (JEIOG) research program. These sources include categories traditionally labeled 'other stationary source combustion': residential, commercial/institutional, industrial, and electric utility fuel-burning sources that are not inventoried as point sources because they are too small or numerous to inventory individually. The report consists of 10 chapters: Introduction, Industrial Fuel Combustion Methodologies for Existing Categories, Industrial Wood Fuel Combustion Methodologies, Crude Oil Combustion Emission from Field Operations, Residential Combustion Source Methodologies, Sulfur Content, Ash Content, Electric Utility Area Source Fuel Use, Error Handling Procedures, and Conclusions and Research Recommendations. Each chapter summarizes existing methodologies (if any exist), then presents proposed algorithms. Emission factors and data sources required to implement the new methodologies are introduced in each chapter.

Keywords: *Air pollution, *Stationary sources, *Combustion products, Concentration(Composition), Study estimates, Wood fuels, Crude oil, Residential buildings, Industrial wastes, Nitrogen oxides, Sulfur dioxide, Particulates, Electric power plants, Sulfur content, Ash content, Error analysis, Recommendations, Fuels, Volatile organic compounds, *Emission inventories.

PB93-135671/REB PC A01/MF A01
Corvallis Environmental Research Lab., OR.
Effects of Repeated Ammonium Sulfate Applications on Soil Leachate Chemistry on the Fernow Experimental Forest in West Virginia, USA. Symposium paper.
Northeastern Forest Experiment Station, Parsons, WV. Timber and Watershed Lab.
P. Edwards, J. Kochenderfer, and M. Adams. 1992, 5p EPA/600/A-92/281
Sponsored by Corvallis Environmental Research Lab., OR.

In 1987, a cooperative study was made to examine the effects of acidification to various ecosystem parameters. Ammonium sulfate fertilizer was applied to a watershed on the Fernow Experimental Forest in the central Appalachians to elevate N and S inputs and induce acidification. Annually, the fertilizer amendments were approximately double ambient N and S loads. The results presented here describe soil leachate chemistry responses to the manipulation.

Keywords: *Ammonium sulfate, *Soil chemistry, *Forest land, *Acidification, Fertilizers, Ecosystems, Field tests, Soil properties, Watersheds, Hardwoods, Soil horizons, Chemical analysis, Sampling, pH, Seasonal variations, Concentration(Composition), Forest trees, West Virginia, Lycimeters, Buffers(Chemistry), *Leachate.

PB93-135689/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Trace Organic Contaminants in Anthropogenically Acidified Surface Waters. Symposium paper.
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
J. Ford, and T. C. Young. 29 Sep 92, 23p EPA/600/A-92/282
Presented at Dahlem Workshop on Acidification of Freshwaters, Dahlem, Germany, September 27-October 3, 1992. Prepared in cooperation with Clarkson Univ., Potsdam, NY. Dept. of Civil and Environmental Engineering. Sponsored by Corvallis Environmental Research Lab., OR.

The biological effects of trace organic contaminants in anthropogenically acidified surface waters are mediated by the nature of the association of trace organics with dissolved and particulate organic matter (DOC and POC). The paper (1) briefly reviews available deposition estimates for selected contaminants in areas of North America currently receiving acidic deposition, (2) provides a graphical description interrelating selected common organic contaminants according to basic physico-chemical properties that affect partitioning in aquatic systems (solubility, vapor pressure, and octanol-water partition coefficient), and (3) discusses the likely effects of surface water acidification on POC/

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DOC-contaminant-biota partitioning, based on this spectrum of properties.

Keywords: *Acidification, *Surface waters, *Organic compounds, *Aquatic biology, *North America, Pollution control, Wildlife, Physical properties, Chemical properties, Vapor pressure, Concentration, Atmospheric circulation, Fertilizers, Pesticides, Agriculture, Environmental impacts, Fossil fuels, Industrial wastes, Trace elements.

PB93-135697/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.

Rice Field Inventory Using AVHRR Data. Symposium paper.

ManTech Environmental Technology, Inc., Corvallis, OR.

D. Bachelet, and J. L. Mailander. 1992, 22p EPA/600/A-92/283

Contract EPA-68-C8-0006

Presented to the Asian Conference on Remote Sensing (13th), Ulaan Baatar, Mongolia, October 7-11, 1992. See also N85-17400. Prepared in cooperation with Oregon State Univ., Corvallis. Dept. of Geosciences. Sponsored by Corvallis Environmental Research Lab., OR.

Time series Normalized Difference Vegetation Index (NDVI) data, computed from Advanced Very High Resolution Radiometer (AVHRR) data, were used in a pilot study to locate areas of rice cultivation in the United States of America (USA). The large size of rice fields and the relative phenological homogeneity of rice-growing regions in the US make them ideal sites for a pilot study. NDVI dynamics were examined using 16km global area coverage satellite data from 1988. Unsupervised classification was used to distinguish rice fields from other vegetation cover types. The technique was first used for California where contrast between irrigated and natural vegetation is the most pronounced. Identical methods were used to classify vegetation in China where the field size is much smaller and cropping season more extended.

Keywords: *Rice plants, *Radiometers, *Cultivated lands, *Remote sensing, Field crops, Vegetation growth, China, Graphs(Charts), United States, *Advanced Very High Resolution Radiometers.

PB93-135713/REB PC A02/MF A01
Robert S. Kerr Environmental Research Lab., Ada, OK.

Transformation of Carbon Tetrachloride in the Presence of Sulfide, Biotite, and Vermiculite. Journal article.

Stanford Univ., CA. Dept. of Civil Engineering.

M. R. Kriegman-King, and M. Reinhard. c1992, 7p EPA/600/J-92/414

Grant EPA-R-816776

Pub. in Environmental Science Technology, v26 n11 p2198-2206 1992. See also PB92-179738. Sponsored by Robert S. Kerr Environmental Research Lab., Ada, OK.

Carbon tetrachloride is transformed in aqueous solutions containing dissolved hydrogen sulfide more rapidly in the presence of the minerals biotite and vermiculite than in homogeneous systems. Approximately 80-85% of the CCl₄ was transformed to CO₂ via the measured intermediate, CS₂. Chloroform comprised 5-15% of the products. The remaining 5% of the products were an unidentified non-volatile compound and CO. At 25°C, the half-life of CCl₄ with 1 mM HS was calculated to be 2600, 160, and 50 days for the homogeneous, vermiculite (114 sq m/L), and biotite (55.8 sq m/L) systems, respectively. The CCl₄ transformation rate was found to be dependent on the type and quantity of the solid and the temperature, but was independent of pH and HS(-) concentration above a critical HS(-) concentration. The activation energies (+ or - 95% confidence intervals) were determined to be 122 + or - 32, 91.3 + or - 8.4, and 59.9 + or - 13.3 kJ/mol for the homogeneous, vermiculite, and biotite systems, respectively. The CCl₄ transformation rate exhibited first-order behavior with respect to biotite surface area concentration SC(sub biotite) below 55.8 sq m/L. The rate of CCl₄ transformation was independent of HS(-) concentration when (HS(-)) = 0.5-4 mM and SC(sub biotite) = 55.8 sq m/L. Below (HS(-)) = 0.5-4 mM, the rate law was dependent on HS(-) concentration. (Copyright) (c) 1992 American Chemical Society.)

Keywords: *Bioconversion, *Water pollution effects, *Carbon tetrachloride, *Minerals, Biodegradation,

Water chemistry, Hydrogen sulfide, Reaction kinetics, Carbon dioxide, Carbon monoxide, Biotite, Vermiculite, Concentration(Composition), Reprints, Chemical reaction mechanisms.

PB93-135721/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.

Recent Sulfur Enrichment in the Sediments of Little Rock Lake, Wisconsin. Journal article.

Minnesota Univ., St. Paul. Water Resources Research Center.

L. A. Baker, D. R. Engstrom, and P. L. Brezonik.

c1992, 16p EPA/600/J-92/415

Pub. in Limnology and Oceanography, v37 n4 p689-702 1992. See also PB87-179966. Prepared in cooperation with Minnesota Univ., Minneapolis. Sponsored by Corvallis Environmental Research Lab., OR.

Multiple sediment cores collected from Little Rock Lake, Wisconsin, prior to experimental acidification show that total sulfur accumulation rates increased during the past century, with most of the increase occurring in the chromium-reducible (CRS) and organic fractions. The increased sulfur accumulation is a result of diagenetic processes within the sediments, rather than changes in seston deposition rates or terrestrial inputs. The enrichment has occurred because atmospheric sulfate deposition rates have increased over the past century, resulting in increased lakewater sulfate concentrations. This has increased the diffusional flux to the sediments and increased the extent of diagenetic immobilization. Individual cores had markedly different sulfur accumulation rates, demonstrating the importance of collecting multiple cores to determine lakewide sediment flux.

Keywords: *Acidification, *Little Rock Lake, Sediments, pH, Sampling, Fishes, Aquatic plants, Chemical properties, Sulfur, Sulfates, Accumulation, Zooplankton, Diagenesis.

PB93-135739/REB PC A03/MF A01
Pathogenicity of 'Salmonella pullorum' in Northern Bobwhite Quail and Mallard Ducks. Journal article.

Corvallis Environmental Research Lab., OR.

P. S. Buckholz, and A. Fairbrother. c1992, 11p EPA/600/J-92/416

Pub. in Avian Diseases, v36 p304-312 1992. See also PB-187 071. Prepared in cooperation with ManTech Environmental Technology, Inc., Corvallis, OR.

Ten-day-old northern bobwhite quail and mallards were inoculated orally and intravenously with *Salmonella pullorum* at concentrations of one thousand to 10 billion colony-forming units/ml. The bacterium was found to be extremely virulent in young bobwhite during two experiments with 85-100% mortality; however, no mallards died or exhibited any signs of morbidity. Blood chemistry values and antibody titers of bobwhite were inconclusive due to high mortality rate. Significant differences ($P < 0.05$) were observed in serum calcium, uric acid, and lactate dehydrogenase values of treated mallards, and antibody titers were detected as early as one week following inoculation in a pilot test. The bacterium was cultured from bobwhite feces and from liver, lungs, heart, kidneys, pancreas, and spleen tissues removed at necropsy; however, it was isolated only from liver tissue of four mallards. Tissues submitted by histopathological examination showed bobwhite to be severely affected. Small bacterial colonies were frequently found in the capillaries of various organs of the bobwhite, particularly in the heart and kidneys. Mallard tissues were found to be essentially normal except for slight vacuolar changes in the liver.

Keywords: *Pathology, *Ducks, *Salmonella infections, *Game birds, Bacterial infections, Lethal dose 50, Mortality, Clinical chemistry, Reprints, Quail, *Salmonella pullorum*, *Collinus virginianus*, *Anas platyrhynchos*, Pathogenicity, *Pullorum* disease, Bacillary white diarrhea.

PB93-135747/REB PC A03/MF A01
Environmental Monitoring and Assessment Program, EMAP-Surface Waters: A Northeast Lakes Pilot. Journal article.

Corvallis Environmental Research Lab., OR.

D. P. Larsen, D. L. Stevens, A. R. Selle, and S. G. Paulsen. c1991, 13p EPA/600/J-92/417

Pub. in Lake and Reservoir Management, v7 n1 p1-11 1991. See also PB92-231497 and PB91-145730. Pre-

pared in cooperation with ManTech Environmental Technology International, Inc., Corvallis, OR., and Nevada Univ., Las Vegas.

In response to a growing need for information about the condition of the nation's ecosystems at regional and national scales, the U.S. Environmental Protection Agency (USEPA) recently embarked on a program called EMAP (Environmental Monitoring and Assessment Program) using a uniform approach for national assessments across and among ecosystem types. In its focus on lake condition at the regional and national scale, EMAP-Surface Waters will address concerns about the present extent and geographical distribution of lakes, their current ecological condition, the proportion that is degrading or improving, where, and at what rate, and the likely causes of adverse effects. The national design is based on a systematic grid of randomly placed points, so that conditions and trends can be estimated with known uncertainty. Lake condition will be assessed primarily through biological measurements; physical, chemical, and landscape information will be used to support and interpret conditions estimated by the biological indicators. The paper describes the EMAP design and indicators strategy tailored for lakes, with examples showing how these indicators can describe condition and trends at national and regional scales.

Keywords: *Environmental monitoring, *Surface waters, *Water pollution sampling, *Aquatic ecosystems, Regional analysis, National government, Hydrology, Biological indicators, Trends, Environmental impact assessments, Water quality, Biological effects, Geography, Information management, *Environmental Monitoring and Assessment Program.

PB93-135754/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.

Comparison of Episodic Acidification in Canada, Europe and the United States. Journal article.

University of East Anglia, Norwich (England). School of Environmental Sciences.

P. J. Wigginton, T. D. Davies, M. Tranter, and K. N. Eshleman. c1990, 30p EPA/600/J-92/418

Pub. in Environmental Pollution, v78 p29-35 1992. See also PB92-100486. Prepared in cooperation with Southampton Univ. (England). Dept. of Oceanography, and Virginia Univ., Charlottesville. Dept. of Environmental Sciences. Sponsored by Corvallis Environmental Research Lab., OR.

Based on reviews and synthesis of literature from Canada, Europe, and the United States, episodic acidification is practically an ubiquitous process in streams and drainage lakes. pH depressions are frequently smaller in systems with low pre-episodic pH levels. Studies on European surface waters have most frequently reported episodes with minimum pH levels below 4.5. In Canada and the United States, studies have also reported a number of systems that have had minimum pH levels below 4.5. Episodic acidification is controlled by a combination of natural and anthropogenic factors. In all three locations acidic deposition has increased the severity (minimum pH reached) of episodes in some streams and lakes.

Keywords: *Acidification, *Water pollution, *Water quality, *Air water interactions, *Acid neutralizing capacity, Hydrology, United States, Canada, Europe, pH, Man environment interactions, Natural emissions, Comparison, Air pollution, Streams, Lakes, Surface waters, *Episodic acidification, Foreign technology.

PB93-135762/REB PC A01/MF A01
Corvallis Environmental Research Lab., OR.

Who Will Speak for Biodiversity? Journal article.

ManTech Environmental Technology International, Inc., Corvallis, OR.

R. F. Noss. c1992, 4p EPA/600/J-92/419

Pub. in Conservation Biology, v3 n2 p202-203 Jun 89.

See also PB92-108117. Sponsored by Corvallis Environmental Research Lab., OR.

A brief editorial-style essay is presented, invited by Dr. David Ehrenfeld, editor of Conservation Biology. The essay is philosophical and contains no data or explicit policy implications.

Keywords: *Species diversity, *Ethics, Conservation, Reprints, *Biodiversity.

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PB93-136364/REB PC A05/MF A01
Restoration of the Anacostia River. Report to the Congress.
 Environmental Protection Agency, Annapolis, MD.
 Chesapeake Bay Program.
 9 Jul 92, 78p CBP/TRS-79/92

The House and Senate Committees on Appropriations in their approval of the U.S. Environmental Protection Agency's (EPA) FY92 Operating Plan directed EPA to conduct a study of the Anacostia River. The study 'should include...an analysis of the extent to which pollution in the Anacostia River is harming the Bay's ecosystem; what steps are needed to restore the Anacostia's water quality and a timeline showing when these steps could be met; potential roles for EPA in the Anacostia River clean-up and that of other federal agencies; and an inventory of activities currently underway to restore the river.'

Keywords: *Anacostia River, *Remedial action, *Water quality management, *Water pollution control, Watersheds, Urban areas, US EPA, Aquatic ecosystems, Habitats, Federal agencies, Pollution control agencies, Industrial wastes, Regulations, Permits, *Chesapeake Bay Program, Cleanup operations, National Pollutant Discharge Elimination System.

PB93-136521/REB PC A06/MF A02
Strategic Assessment of Near Coastal Waters: Northeast Case Study. Interim draft rept.
 Environmental Protection Agency/National Oceanic and Atmospheric Administration Team on Near Coastal Waters, Rockville, MD.
 Nov 87, 119p

The report is an interim draft of a forthcoming case study of coastal and estuarine data for 17 estuaries of the Northeast USA. It illustrates the progress made toward completion of the final report. Most of the information presented is compiled from data bases developed by NOAA's continuing program of strategic assessments, including its National Coastal Pollutant Discharge Inventory, National Coastal Wetlands Inventory, and Public Outdoor Recreational Facilities Inventory. Data are compiled and organized into 7 sections: (1) physical and hydrologic characteristics; (2) land use and population; (3) nutrient discharges to estuaries; (4) classified shellfish waters; (5) toxic discharges to estuaries and hazardous waste disposal sites; (6) coastal wetlands; and (7) public outdoor recreation facilities. The fifth section has been completed to illustrate the approximate scale and scope of the information content and discussion that will be presented for each theme in the final report.

Keywords: *Coastal zone management, *Water pollution, *Estuaries, Water management, Forecasting, Hydrology, Atlantic Ocean, Nutrients, Hazardous materials, Waste disposal, Wetlands, Recreation, Toxic substances, Land use, Pollution sources, *Northeast Region(United States).

PB93-136612/REB PC A03/MF A01
EPA's Ground Water and Drinking Water Program: Making a Difference. Annual rept.
 Environmental Protection Agency, Washington, DC.
 Office of the Assistant Administrator for Water.
 Oct 92, 36p EPA/810/R-92/001

This is the first Annual Report highlighting the successes of EPA's newly formed Office of Ground Water and Drinking Water and its counterparts in the EPA Regional Offices. The report chronicles a year of change and progress and describes plans for meeting the many important challenges facing the program.

Keywords: *Ground water, *Drinking water, *Water quality management, US EPA, Protection, Project management, Public health, American Indians, Law enforcement, Technical assistance, Water wells, Tests, Laboratories, International relations, States(United States).

PB93-136620/REB PC A05/MF A01
 Army Medical Research and Development Command, Fort Detrick, MD.
Health Advisory for Zinc Chloride.
 Environmental Protection Agency, Washington, DC.
 Office of the Assistant Administrator for Water.
 J. M. Donohue, L. Gordon, C. Kirman, and W. C. Roberts. Sep 92, 80p

Sponsored by Army Medical Research and Development Command, Fort Detrick, MD.

The Health Advisory (HA) provides information on the health effects, analytical methodology and treatment technology that would be useful in dealing with zinc chloride contamination of drinking water. Based on available toxicity data the HA values for zinc chloride are given. Zinc chloride is classified as Group D, not classifiable as to human carcinogenicity. Health Advisories describe nonregulatory concentrations of drinking water contaminants at which adverse health effects would not be anticipated to occur over specific exposure durations. The HAs, developed by the US Environmental Protection Agency, Office of Water (OW), are not legally enforceable Federal standards and are subject to change as new information becomes available. Health Advisories are developed for One-day, Ten-day, Longer-term and Lifetime exposures based on data describing noncarcinogenic end points of toxicity. For those substances that are known or probable human carcinogens, according to the EPA classification scheme, Lifetime HAs are not recommended.

Keywords: *Potable water, *Water quality, *Zinc chlorides, *Water pollution effects(Humans), *Toxicology, *Zinc compounds, Public health, Health hazards, Water pollution effects(Animals), Ingestion(Biology), Zinc oxides, Zinc sulfates, Exposure, Pharmacokinetics, Carcinogenicity tests, Metabolism, Mutagenicity tests, Zinc ions, CAS 7646-85-7, CAS 7440-66-6, CAS 7446-20-0, CAS 1314-13-2.

PB93-136693/REB PC A03/MF A01
Chesapeake Bay Program Annual Progress Report, Wetlands Workgroup, December 1991.
 Annual progress rept.
 Environmental Protection Agency, Annapolis, MD.
 Chesapeake Bay Program.
 Dec 91, 13p CBP/APR-92/105

The announcement by President Bush of a national 'no net loss' wetlands policy is the result of growing public concern about the rapid loss of these important resources. Wetlands provide essential breeding, spawning, nesting and wintering habitats for a major portion of the region's fish and wildlife. In addition, wetlands function to purify surface water, moderate flood flows, maintain year round stream and river flows, reduce erosion and support commercial fishery and recreation industries. In recognition of the importance of wetlands to the environmental quality and economic productivity of the Bay, the Chesapeake Executive Council adopted the Chesapeake Bay Wetlands Policy in December 1988. The Policy includes a commitment to adopt an implementation plan. The annual report discusses the Living Resources Subcommittee's Wetlands Workgroup progress on these projects over the last year, and the near term goals for the next year. The progress to date includes work completed for the first phase and beginning to set up the second phase of the implementation plan.

Keywords: *Wetlands, *Natural resources management, *Environmental quality, Implementation, Surface waters, Water quality management, Water pollution control, Flood control, Water flow, Habitats, Fish management, Wildlife management, Recreation, *Chesapeake Bay Program, Chesapeake Bay Wetlands Policy, Natural wetlands, Created wetlands.

PB93-136901/REB PC A03/MF A01
 Environmental Protection Agency, Washington, DC.
 Office of Marine and Estuarine Protection.
Susceptibility of East Coast Estuaries to Nutrient Discharges: Albemarle/Pamlico Sound to Biscayne Bay. Summary rept.
 National Ocean Service, Rockville, MD. Strategic Assessment Branch.
 H. Quinn, J. P. Tolson, C. J. Klein, S. P. Orlando, and C. Alexander. Jun 89, 38p
 See also PB93-136927 and PB93-112357. Prepared in cooperation with Delaware Univ., Newark. Coll. of Marine Studies. Sponsored by Environmental Protection Agency, Washington, DC. Office of Marine and Estuarine Protection.

The report is the first in a series being developed to assist US EPA implement its Near Coastal Waters and National Estuary Programs. It summarizes estimates of the relative susceptibility and status of 17 estuaries on the East Coast from North Carolina through Florida with respect to nutrient-related pollution. The information

in the report is intended to increase understanding of coastal environmental problems and to serve as a screening tool for coastal resource decision-making. A 1-page summary is included in the report for each of the 17 estuaries in the East Coast region from Albemarle/Pamlico Sound through Biscayne Bay. Each summary contains data on significant physical and hydrologic features, estimations of nutrient loading, pollution susceptibility, and nutrient concentrations, along with a narrative to assist the reader in interpreting the data.

Keywords: *Water pollution, *Coastal regions, *Estuaries, *Pollution sources, *Nutrients, Hydrology, Water management, Atlantic Ocean, Albemarle/Pamlico Sound, Biscayne Bay, Concentration(Composition), Comparison, Graphs(Charts), Study estimates, Point sources, Nonpoint sources, Upstream, *Southeast Region(United States), Eastern Region(United States), Near Coastal Waters and National Estuary Programs.

PB93-136927/REB PC A03/MF A01
 Environmental Protection Agency, Washington, DC.
 Office of Marine and Estuarine Protection.
Susceptibility of East Coast Estuaries to Nutrient Discharges: Passamaquoddy Bay to Chesapeake Bay. Summary rept.
 National Ocean Service, Rockville, MD. Strategic Assessment Branch.
 H. Quinn, J. P. Tolson, C. J. Klein, S. P. Orlando, and C. Alexander. Jun 89, 44p
 See also PB93-136901. Prepared in cooperation with Delaware Univ., Newark. Coll. of Marine Studies. Sponsored by Environmental Protection Agency, Washington, DC. Office of Marine and Estuarine Protection.

This is the third report in a series being developed to assist the US EPA implement its Near Coastal Waters and National Estuary Programs. It summarizes estimates of the relative susceptibility and status of 17 estuaries on the East Coast from Maine through Virginia, with respect to nutrient-related pollution. The information is intended to increase understanding of coastal environmental problems and to serve as a screening tool for coastal resource decision-making. A one-page summary is included in the report for each of the 17 estuaries in the East Coast region from Passamaquoddy Bay through Chesapeake Bay. Each summary contains data on significant physical and hydrologic features, estimations of nutrient loading, pollution susceptibility, and nutrient concentrations, along with a narrative to assist the reader in interpreting the data.

Keywords: *Water pollution, *Coastal regions, *Estuaries, *Pollution sources, *Nutrients, US EPA, Passamaquoddy Bay, Chesapeake Bay, Water management, Hydrology, Graphs(Charts), Atlantic Ocean, Phosphorus, Nitrogen, Study estimates, Comparison, Concentration(Composition), Point sources, Nonpoint sources, Upstream, *Northeast Region(United States), Eastern Region(United States), Near Coastal Waters and National Estuary Program.

PB93-138147/REB PC A04/MF A01
 Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
OAQPS Control Cost Manual (Fourth Edition), Supplement 2. Final rept.
 Radian Corp., Research Triangle Park, NC.
 W. Barbour, R. Oommen, G. Shareef, and W. Vatauvuk.
 Oct 92, 69p EPA/450/3-90/006B
 Contract EPA-68-D1-0117
 See also PB92-137181 and PB90-169954. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.

This is the second supplement to the OAQPS Control Cost Manual (Fourth Edition). The supplement consists of a new Manual chapter, Chapter 9 ('Gas Absorbers'). Like the other chapters in the Manual, Chapter 9 is self-contained. It discusses: (1) the types and applications of packed column gas absorbers used in air pollution control; (2) the theory underlying their operation and design; (3) basic sizing procedures; and (4) current data and procedures for estimating study-level (+ or - 30%-accurate) capital and annual costs. In particular, the chapter contains 1991 column and packing costs, which are correlated with appropriate sizing parameters (e.g., column height and diameter). Finally, Chapter 9 includes: a comprehensive example problem that illustrates the sizing and costing procedures;

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three appendices; a table of contents; and a list of references.

Keywords: *US EPA, *Cost analysis, *Air pollution control equipment, *Air pollution economics, *Absorbers(Equipment), Operating costs, Capitalized costs, Absorbers(Materials), Design criteria, Performance evaluation, Operation and maintenance, Column packings, Reprints, Office of Air Quality Planning and Standards.

PB93-138154/REB **PC A07/MF A02**
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. **Air/Superfund National Technical Guidance Study Series: Applicability of Open Path Monitors for Superfund.** Final rept. Radian Corp., Austin, TX. J. Draves. May 92, 136p EPA/451/R-92/001 See also PB89-180061, PB89-180053, PB90-113382 and PB90-113374. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.

The document provides guidance on the applicability of Open Path Monitors (OPMs) for ambient air monitoring at Superfund sites. The relatively limited use of these devices for ambient air monitoring has led to many questions concerning their applicability, reliability, and sensitivity for these applications. Information is provided as to the general capabilities of OPMs. The compounds that each method is capable of detecting are tabulated. The detection limits of each type of instrument are discussed and compared to the detection limits achievable using conventional techniques such as EPA Method TO-14 as well as to short-term and long-term health-based action levels. The data turnaround time and the ability to resolve temporal variations in emissions are also discussed.

Keywords: *Superfund, *Remedial action, *Path of pollutants, *Air pollution monitors, *Hazardous materials, Guidelines, Performance evaluation, Environmental monitoring, Spectrum analysis, Concentration(Composition), Information transfer, Forecasting, Remote sensing, *Open Path Monitors, Cleanup operations.

PB93-138451/REB **PC A07/MF A02**
Illinois Water Quality Management Plan. Illinois State Environmental Protection Agency, Springfield. Div. of Water Pollution Control. Dec 92, 139p IEPA/WPC/92-220 Prepared in cooperation with Greater Egypt Regional Planning and Development Commission, Carbondale, IL, Northeastern Illinois Planning Commission, Chicago, and Southwestern Illinois Metropolitan and Regional Planning Commission, Collinsville.

The report describes the purpose of the plan to consolidate and streamline portions of approved state and areawide water quality management (WQM) plans in order to facilitate their usage in the operations of all designated WQM agencies. The report identifies both point and nonpoint pollution sources, reviews policies and regulations already in place and makes recommendations for pollution prevention and control. Information on the plan's management structure is also included.

Keywords: *Water pollution sources, *Water quality management, Regulations, State government, Water pollution control, Pollutants, Water pollution abatement, Water policy, Water quality standards, Surface waters, Ground water, *Illinois, Point sources, Non-point sources.

PB93-138665/REB **PC A06/MF A02**
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab. **Evaluation of Nitrogen Oxide Emissions Data from TVA Coal-Fired Boilers.** Final rept. Jun 91-Jul 92. Radian Corp., Research Triangle Park, NC. S. Stamey-Hall. Dec 92, 124p DCN-92-239-022-02-06, EPA/600/R-92/242 Contract EPA-68-D1-0013 Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The report gives results of a study during which nitrogen oxide (NOx) emission rates from 30 boilers at 11

TVA coal-fired plants were calculated and compared with the calculated rate for each boiler type using EPA emission factors (AP-42). Current AP-42 emission factors for NOx from utility coal-fired boilers do not account for variations in either emissions as a function of generating unit load, or designs of boilers of the same general type, particularly wall-fired boilers. TVA recently compiled short-term NOx emissions data from 30 units at 11 TVA coal-fired plants. Analysis of these data indicates that: (1) to varying degrees, NOx emissions increase with increasing load for all but single- and opposed-wall-fired boilers; (2) using the current AP-42 quality rating scheme for each of the six boiler types, factoring in the TVA and recent literature data results in improved quality ratings for all NOx emission factors; and (3) there was no evident relationship between NOx emissions and fuel nitrogen content or fuel ratio (fixed carbon to volatile matter).

Keywords: *Nitrogen oxides, *Air pollution sampling, *Emission factors, *Boilers, Study estimates, Combustion products, Alabama, Kentucky, Tennessee, Tables(Data), Coal, Burners, Cyclone combustors, Concentration(Composition), US Tennessee Valley Authority.

PB93-139350/REB **PC A10/MF A03**
RCRA Ground-Water Monitoring: Draft Technical Guidance. Environmental Protection Agency, Washington, DC. Office of Solid Waste. Nov 92, 211p EPA/530/R-93/001 See also PB91-140186.

The manual was prepared to provide guidance for implementing the ground-water monitoring regulations for regulated units contained in 40 CFR Part 264 Subpart F and the permitting standards of 40 CFR Part 270. The manual also provides guidance to owners and operators of treatment, storage, and disposal facilities (TSDFs) that are required to comply with the requirements of 40 CFR Part 264 Subparts J (Tank Systems), K (Surface Impoundments), L (Waste Piles), N (Landfills), and X (Miscellaneous Units). This document updates technical information contained in other sources of U.S. EPA guidance, such as chapter eleven of SW-846 (Revision 0, September 1986) and the Technical Enforcement Guidance Document (TEGD).

Keywords: *Water pollution sampling, *Waste management, *Hazardous materials, *Ground water, Manuals, Pollution regulations, Performance standards, Permits, Guidelines, Law enforcement, Waste disposal, Waste treatment, Waste storage, *Resource Conservation and Recovery Act.

PB93-139681/REB **PC A07/MF A02**
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. **Life-Cycle Assessment: Inventory Guidelines and Principles.** Final rept. Battelle Columbus Labs., OH. B. W. Vigon, D. A. Tolle, B. W. Cornaby, C. L. Harrison, and T. L. Boguski. Jan 93, 127p EPA/600/R-92/245 Contract EPA-68-CO-0003 Prepared in cooperation with Franklin Associates Ltd., Prairie Village, KS. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

The document describes the three components of a life-cycle assessment (inventory analysis, impact analysis, and improvement analysis) as well as scoping activities, presents a brief overview of the development of the life-cycle assessment process, and develops guidelines and principles for implementation of a product life-cycle assessment. The major stages in a life cycle are raw materials acquisition, manufacturing consumer use/reuse/maintenance, and recycle/waste management. The basic steps of performing a life-cycle inventory (defining the goals and system boundaries, including scoping; gathering and developing data; presenting and reviewing data; and interpreting and communicating results) are presented along with the general issues to be addressed. The system boundaries, assumptions, and conventions to be addressed in each stage of the inventory are presented.

Keywords: Life cycles, Commodities, Inventories, Raw materials, Acquisition, Manufacturing, Waste management, Environmental impact, *Life-cycle assessment.

PB93-141026/REB **PC A04/MF A01**
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. **On-Site Waste Ink Recycling: Technology Evaluation Report.** Battelle, Columbus, OH. A. R. Gavaskar, R. F. Olfenbuttel, and J. A. Jones. Jan 93, 60p EPA/600/R-92/251 Contract EPA-68-CO-0003 Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

Recycling ink has good potential as a way to reduce waste and promote long-term cost savings. The evaluation summarized here addresses the product quality, waste reduction, and economic issues involved in recycling printing ink in a facility such as The Hartford Courant newspaper in Hartford, CT. The specific unit evaluated is based on the technology of distillation and filtration. Selected performance tests on the waste, recycled, and virgin inks determined product quality. The recycling unit achieved a good product quality of recycled ink, and the recycled ink fared well in such laboratory tests as viscosity, grind, residue, tack, tinting strength, water content, and water pickup. Qualified professionals, in comparisons with newspapers printed with virgin ink, favorably reviewed newspapers printed with recycled ink. Ink and solvent that would have gone to waste were recovered and reused. The resulting cost saving gave a payback period of about 10 years.

Keywords: *Waste recycling, *Pollution abatement, *Printing inks, Performance evaluation, Newsprint, Economic analysis, Reviews, Environmental protection, Distillation, Filtration, Product development, Quality assurance, *Waste minimization, Newspapers, Hartford(Connecticut).

PB93-141034/REB **PC A17/MF A03**
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. **Pilot-Scale Incineration of Contaminated Sludges from the Bofors-Nobel Superfund Site.** Acurex Environmental Corp., Jefferson, AR. C. King, and L. R. Waterland. Jan 93, 378p EPA/600/R-92/240 Contract EPA-68-C9-0038 Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

A detailed test program was performed at the U.S. EPA Incineration Research Facility to help determine the effectiveness of incineration in treating two contaminated lagoon sludges from the Bofors-Nobel Superfund Site in Muskegon, MI. The sludges tested were contaminated with various organic contaminants and trace metals. Three incineration tests were conducted for each sludge, for a total of six tests, in the facility's rotary kiln incineration system. Test results suggested that incineration under the conditions tested represented an effective treatment option for both sludges. Particulate emissions at the scrubber exit were high during incineration of one of the sludges while cadmium and lead collection efficiencies were low. This suggested the wet scrubber system may not be an appropriate choice for air pollution control.

Keywords: *Sludge, *Incinerators, *Pilot plants, Sludge digestion, *Waste treatment, Contamination, Hazardous materials, Kilns, Air pollution control equipment, Scrubbers, Combustion efficiency, Sites, Remedial action, *Incineration Research Facility, *Superfund, Muskegon(Michigan).

PB93-141042/REB **PC A04/MF A01**
Formation and Control of Combustion Pollutants from Gasoline-Fueled Spark-Ignition Motor Vehicle Engines. (Revised November 1992). Technical rept. Environmental Protection Agency, Ann Arbor, MI. Certification Div. J. W. Bozek. Nov 92, 59p EPA/AA/CA/CPSB-90/01

The purpose of the report is to provide simple explanations regarding the formation and control of combustion pollutants from gasoline-fueled spark-ignition motor vehicle engines. Formation phenomena are explained on the basis of well-known cause and effect relationships. Pollution control techniques are explained on the basis of the operating characteristics of systems which are already in widespread use. Two ap-

pendices are included which present additional information.

Keywords: *Spark ignition engines, *Combustion products, *Air pollution abatement, Automobiles, Internal combustion engines, Gasoline, Combustion kinetics, Exhaust gases, Exhaust systems, Combustion control, Hydrocarbons, Catalytic converters, Figures.

PB93-141059/REB PC A03/MF A01
Evaluation of an Emitec Resistively Heated Metal Monolith Catalytic Converter on Two M100 Neat Methanol-Fueled Vehicles. Technical rept.
Environmental Protection Agency, Ann Arbor, MI. Office of Mobile Sources.
G. K. Piotrowski, and R. M. Schaefer. Dec 92, 31p
EPA/AA/CTAB-92/04

The report describes the evaluation of a resistively heated catalyst system on two different methanol-fueled vehicles. The EMITEC catalyst consisted of a compact resistively heated metal monolith in front of a larger conventional main converter. The EMITEC catalyst was evaluated on two neat methanol-fueled vehicles, a 1981 Volkswagen Rabbit and a 1988 Toyota Corolla. Emission testing was conducted over the Federal Test Procedure (FTP) CVS-75 test cycle. The emissions of primary interest were cold start methanol (unburned fuel), carbon monoxide and formaldehyde.

Keywords: *Catalytic reactors(Exhaust systems), *Methanol, *Motor vehicles, *Catalytic converters, *Air pollution control equipment, Alcohol fuels, Federal Test Procedures, Performance evaluation, Air pollution sampling, Exhaust emissions, Carbon monoxide, Formaldehyde, Heating, *EMITEC catalysts, Electrically heated catalytic converters.

PB93-141067/REB PC A11/MF A03
Corvallis Environmental Research Lab., OR.
Quality Assurance Project Plan: 1991 EMAP Wetlands Southeastern Pilot Study.
Louisiana State Univ., Baton Rouge. Dept. of Oceanography and Coastal Sciences.
E. M. Swenson, J. M. Lee, and R. E. Turner. Dec 92, 235p EPA/620/R-92/002
See also PB92-122761. Sponsored by Corvallis Environmental Research Lab., OR.

The goal of the Environmental Monitoring and Assessment Program - Wetlands (EMAP-Wetlands) Southeastern Pilot Study is to develop field indicators of salt marsh condition. These indicators are of four general types: (1) vegetation; (2) hydrology; (3) soil parameters; and (4) soil constituents. Field measurements and samples will be collected during late summer/early fall in 1991 and will be analyzed to identify which indicators and measurements best delineate salt marsh in 'good' condition from that in 'impaired' condition. Thus the project will involve field work, laboratory analysis, and data analysis. Results from this project will be used to establish criteria and parameters for long-term monitoring and assessment of salt marshes, particularly those parameters that may serve as indicators of healthy salt marsh and deteriorated salt marsh. Since EMAP-Wetlands-Southeastern is a pilot study, the measurement criteria will be evaluated as one of the project goals. Of concern will be how well the standardized sampling methods performed in actual field conditions, and which of these methods can be used to assess and characterize salt marshes.

Keywords: *Wetlands, *Salt marshes, *Quality assurance, *Water quality, *Water pollution abatement, Field tests, Environmental impact assessments, Louisiana, Hydrology, Soil analysis, Vegetation, Data analysis, Sampling, *Environmental Monitoring and Assessment Program.

PB93-141083/REB PC A03/MF A01
Municipal Water Pollution Prevention Bibliography: 1992, The Year of Clean Water. Celebration and Commitment.
Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.
Apr 92, 25p EPA/832/B-92/001

The document has been designed for the use of publicly-owned treatment works (POTW) operators and dischargers to POTW's. It provides a listing of the most current literature available on pollution prevention as it relates to municipal wastewater. A telephone number is provided at the end of each citation to assist the

reader in acquiring further information on each source or a copy of the source.

Keywords: *Bibliographies, *Water pollution abatement, Water pollution sources, *Water pollution control, *Municipalities, Local government, Water treatment, Water quality management, *Publicly owned treatment works.

PB93-141109/REB PC A02/MF A01
Small Systems Meet Superfund Challenge with Point-of-Entry Treatment Units.
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
J. A. Goodrich, T. Stevens, and C. Walsh. Dec 91, 9p
EPA/600/A-92/285
Proceedings of the Hazardous Materials Control/Superfund Conference, Washington, DC., December 3-5, 1991. See also PB89-195010. Prepared in cooperation with NSF International, Ann Arbor, MI., and PSARA Technologies, Inc., Cincinnati, OH.

Several small systems and individual homeowners have been faced with the task of treating their groundwater that has been contaminated with various organic contaminants. Contamination is such that the locations described in this presentation have been designated Federal Superfund sites undergoing emergency or remedial actions. These sites have utilized point-of-entry water treatment devices to treat their groundwater. The devices used include: single and dual granular activated carbon (GAC) columns; air stripping in series with GAC; and ozone/UV followed by GAC. Cost (capital and operating) contaminant removal performance, GAC breakthrough and disinfection byproduct formation will be discussed for several Superfund or state led cleanup actions.

Keywords: *Superfund, *Water treatment, *Potable water, *Waste disposal, *Hazardous materials, Remedial action, Ground water, Granular activated carbon treatment, Strippers, Ozonation, Performance evaluation, Ultraviolet radiation, Cost analysis, Disinfection, Byproducts, Alternatives, Reprints, *Small systems, *Point of entry treatment, Cleanup operations.

PB93-141117/REB PC A02/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Advocate-Low-Cost Process for SO₂ Control. Rept. for Apr-Sep 92.
Acurex Environmental Corp., Research Triangle Park, NC.
W. Jozewicz, B. W. Hall, and C. Singer. 1992, 8p EPA/600/A-92/286
Contract EPA-69-DO-0141
Presented at Conference on Environmental Remediation for Eastern Europe, Budapest, Hungary, October 13-16, 1992. See also PB90-263930, PB91-226423 and PB92-150622. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper discusses sorbent chemistry and process chemistry of the ADVANCED siliCATE(ADVACATE) process, a simple, low-cost add-on technology for SO₂ control, easily retrofitted on existing utility boilers with minimal disruption. It is considered to be capable of removing 90% of SO₂ at a Ca/S stoichiometry of 1.0 and at less than half the cost of a typical wet scrubber. The sorbent is produced by atmospheric (normally 90 C) slurring of Ca(OH)₂ and fly ash, as a source of silica. Alternate sources of silica (e.g., diatomaceous earth, bentonite or montmorillonite clay, sand, and waste glass) were also found to promote the formation of high surface area, highly reactive materials. Recycle and slurry mixing have been incorporated into the process to achieve simultaneous flue gas humidification and enhanced SO₂ absorption. The unit operation of mixing slurry with recycle solids has shown the feasibility of mixer operation with production of solids containing up to 50% moisture. Waste glass-based silicates have particular application to control of acid-gas emissions from waste incinerators. Potential improvements over conventional acid-gas controls are discussed.

Keywords: *Air pollution control, *Fly ash, *Waste utilization, Performance evaluation, Cost analysis, Sorbents, Sulfur dioxide, Calcium hydroxides, Calcium silicates, Slurrying, Boilers, *ADVACATE process, *Flue gas desulfurization.

PB93-141125/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Soil-Mediated Effects of Atmospheric Deposition on Eastern U.S. Spruce-Fir Forests. Book chapter.
Nevada Univ. System, Reno. Desert Research Inst.
D. W. Johnson, and I. J. Fernandez. 1992, 38p EPA/600/A-92/287
Pub. in Ecology and Decline of Red Spruce in the Eastern United States, p235-270 1992. See also PB93-141133 and PB85-106730. Prepared in cooperation with Maine Univ. at Orono. Sponsored by Corvallis Environmental Research Lab., OR.

The coincident observation of 'Waldsterben' in Germany and red spruce decline in the northeastern U.S. has naturally led to some speculation that similar mechanisms may be involved. In the German situation, soil-mediated hypotheses played (and still play) a major role; namely, soil acidification and aluminum toxicity and base cation deficiencies. In the red spruce case, there has been much concern that cation deficiencies and/or aluminum toxicity may also play a major role. The purpose of this chapter is to: (1) review some of the basic properties of soils, nutrition, and nutrient cycling in spruce-fir and fir ecosystems, both in the polluted and in the relatively unpolluted regions of the U.S. and Canada, and (2) to evaluate several soil acidity-related hypotheses for red spruce decline.

Keywords: *Forestry, *Spruces, *Firs, *Terrestrial ecosystems, *Soil chemistry, Plant ecology, Acidity, Nutrients, Aluminum, Cations, Air pollution effects(Plants), Plant chemistry, Reprints, Eastern Region(United States).

PB93-141133/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Characterization of Eastern U.S. Spruce-Fir Soils. Book chapter.
Maine Univ. at Orono.
I. J. Fernandez. 1992, 25p EPA/600/A-92/288
Pub. in Ecology and Decline of Red Spruce in the Eastern United States, p40-63 1992. See also PB93-141125. Sponsored by Corvallis Environmental Research Lab., OR.

The spruce-fir forest of the eastern United States encompasses a diverse range of edaphic conditions due to differences in surficial geology, mineralogy, elevation, and climate. This chapter describes the characteristics of soils supporting eastern spruce-fir ecosystems, including soil properties that are important in understanding forest function and the consequences of atmospheric deposition to forested ecosystems. Chapter 1 describes the silvical characteristics of the spruce-fir forest. The Spruce-Fir Research Cooperative included six intensive study sites; five were high-elevation research sites located from western North Carolina to New Hampshire, with one low-elevation site in Maine. Information gained from research at these sites, and other relevant research from these regions, provides the basis for this description of eastern U.S. spruce-fir soils.

Keywords: *Spruces, *Firs, *Soil chemistry, *Terrestrial ecosystems, *Forestry, Cations, Soil properties, Soil classification, Soil fertility, Plant ecology, Reprints, Eastern Region(United States).

PB93-141141/REB PC A02/MF A01
Corvallis Environmental Research Lab., OR.
Influence of Elevated CO₂ and Temperature on Wetland Rice Root Dynamics. Symposium paper.
ManTech Environmental Technology, Inc., Corvallis, OR.
S. R. Holman, and D. Bachelet. 1992, 6p EPA/600/A-92/289
Pub. in Proceedings of International Symposium: Disturbed Climate, Vegetation and Foods, Tsukuba, Japan, October 13-17, 1992. See also DE86007397. Sponsored by Corvallis Environmental Research Lab., OR.

The Chinese rice cultivar Ai-Nam-Tsao was grown to maturity in two replicate experiments under three CO₂ treatments or three temperature treatments in growth chambers for the purpose of exploring the root growth dynamics of rice under possible future climatic changes. Root and shoot growth was significantly enhanced by both elevated CO₂ treatments. There was no difference between elevated CO₂ treatments. Roots responded much more to CO₂ than did shoots. Because rice root biomass is closely coupled to meth-

ane emissions from rice paddies, information about root responses will prove useful in modeling potential future changes in methane emissions under climate change.

Keywords: *Rice plants, *Air pollution effects(Plants), *Carbon dioxide, *Atmospheric temperature, *Root systems, Wetlands, Global warming, Climatic changes, Plant growth, Forecasting, Ecology, Leaves(Botany).

PB93-141158/REB PC A02/MF A01
Effects of CO₂ and Temperature on Five-Rice Cultivars. Symposium paper.

Corvallis Environmental Research Lab., OR.
D. Olczyk, C. Wise, and W. M. Werakoon. 1992, 6p
EPA/600/A-92/290

Pub. in Proceedings of the International Symposium on Disturbed Climate, Vegetation and Foods, Tsukuba, Japan, October 1992. Prepared in cooperation with Oregon State Univ., Corvallis.

To obtain information for more detailed studies of how rice responds to climate change, plants of three high tillering (IR30, IR52, IR74) and two low tillering cultivars (Azucena and IRAT 104) were grown under controlled environment conditions for 28 days. Across all rice cultivars, a 300microl/L increase in CO₂ stimulated root growth more than shoot growth, but neither leaf nor stem weight and leaf or tiller number was affected by CO₂. In contrast, increasing temperature of 6C for 28/22C stimulated shoot but inhibited root growth, resulting in a significant increase (38 to 69%) in leaf number but a significant decrease (32 to 48%) in root/shoot ratio and nonsignificant changes for other parameters. Cultivars responded similarly to CO₂ or temperature; there were no significant CO₂ x cultivar or temperature x cultivar interactions. However, rice cultivars responded differently to the same environment; IRAT 104 plants tended to have lower dry weights and tiller numbers than the IR cultivars with Azucena as intermediate. Azucena had lower root/shoot ratios than the other cultivars.

Keywords: *Rice plants, *Air pollution effects(Plants), *Atmospheric temperature, *Carbon dioxide, Root systems, Climatic changes, Global warming, Plant growth, Ecology, Cultivation, Statistical analysis, Leaves(Botany), Stems(Botany).

PB93-141166/REB PC A02/MF A01
Corvallis Environmental Research Lab., OR.

Organic Acidity in Maine (U.S.A.) Lakes and in HUMEX Lake Skjervatjern (Norway). Symposium paper.

Illinois Univ. at Urbana-Champaign.
M. B. David, G. F. Vance, and P. Kortelainen. c1991, 9p EPA/600/A-92/291

Pub. in Proceedings of the International Nordic Symposium on Humic Substances (3rd), Turku, Finland, August 21-23, 1991, p189-194. Prepared in cooperation with Wyoming Univ., Laramie, and National Board of Waters and the Environment, Helsinki (Finland). Sponsored by Corvallis Environmental Research Lab., OR.

Organic acids, a component of dissolved organic carbon (DOC), can be a major factor in the acidity of many lakes and streams. In order to evaluate the importance of organic acidity, we fractionated (hydrophobic acids and neutrals, hydrophilic acids, bases, and neutrals) and isolated hydrophobic and hydrophilic acids from several Maine seepage and drainage lakes, and from each half of Lake Skjervatjern. For all lakes where DOC was isolated, hydrophilic acids consistently had greater exchange acidities compared to hydrophobic acids. Overall, lake DOC charge relationships and fractions were similar to forest floor DOC leachate chemistry that was also examined in detail at a site in Maine. This suggests that the nature of DOC in the temperate to boreal ecosystems studied (e.g., high carboxylic functional group content) is rather similar regardless of source (e.g., upland soil leachates, wetlands, or Sphagnum deposits).

Keywords: *Acidification, *Lakes, *Water pollution, *Organic acids, *Water chemistry, United States, Maine, Norway, Surface waters, Humus, Soil chemistry, Ecosystems, Anions, Reprints, *Dissolved organic carbon.

PB93-141174/REB PC A02/MF A01
Corvallis Environmental Research Lab., OR.

Biological Sinks for Nitrogen Additions to a Forested Catchment. Symposium paper.

Marine Biological Lab., Woods Hole, MA. Ecosystems Center.

K. J. Nadelhoffer, J. D. Aber, M. R. Downs, B. Fry, and J. M. Melillo. c1992, 9p EPA/600/A-92/292
Grant NSF-BSR90-09190

Pub. in Proceedings of the International Symposium of Experimental Manipulations of Biota and Biogeochemical Cycling in Ecosystems, Copenhagen, Denmark, May 1992. Prepared in cooperation with New Hampshire Univ., Durham. Complex Systems Research Center. Sponsored by Corvallis Environmental Research Lab., OR., and National Science Foundation, Washington, DC.

The goal of our research is to identify and quantify sinks for experimental Nitrogen (N) additions to a forested catchment at the Bear Brooks Watershed in Maine (BBWM) where background N deposition rates are low (< 4 kg/ha/yr). Nitrogen applied to the watershed in April, June, August and October (16.8 kg/ha) 1991 was labeled with a (15N) tracer that increased the abundance of (15N) label from about 0.3663 atm % to 0.4368 atm %. Surface soil was the most important sink for the isotopically labelled N additions. We estimate using (15N) mass balancing that about 3/4 of the 16.8 kg N added during the 1991 growing season was retained in catchment soil and aboveground vegetation with soils being the dominant sink.

Keywords: *Watersheds, *Nitrogen, *Biological effects, *Water pollution effects, *Soil surveys, Forests, Bear Brook, Maine, Tracer techniques, Ecosystems, Plant growth, Trees(Plants), Deposition, Water quality, Ecosystems.

PB93-141182/REB PC A01/MF A01
Corvallis Environmental Research Lab., OR.

Mineral Dissolution Rates: A Comparison of Laboratory and Field Studies. Symposium paper.

Wyoming Univ., Laramie.
N. G. Swoboda-Colberg, and J. I. Drever. c1992, 5p
EPA/600/A-92/293

Pub. in Proceedings of the International Symposium (7th) on Water-Rock Interaction (WRI-7), Park City, UT., July 13-19, 1992. Sponsored by Corvallis Environmental Research Lab., OR.

Dissolution rates of the 75-150 micrometer size fraction of soil from the Bear Brook site in Maine were measured in flow-through reactors and compared to rates measured in small-plot field experiments at the Bear Brook site. The use of small plots and 'untreated' minerals from the same location eliminated many of the uncertainties previously encountered in field-laboratory comparisons. Field dissolution rates, normalized on the basis of geometrical mineral surface area, were smaller than laboratory rates by a factor of about 150. This discrepancy might be due to the fact that the dissolution rate is not proportional to the geometrical surface area over the whole range of grain sizes. Other explanations are imperfect contact between soil minerals and percolating solution, or inhibitory effects of high dissolved aluminum concentrations.

Keywords: *Minerals, *Dissolving, *Water pollution, *Soil surveys, *Bear Brook, Comparison, Experimental design, Field tests, Water chemistry, Acidification, Weathering, Kinetics, Maine.

PB93-141190/REB PC A03/MF A01
Health Effects Research Lab., Research Triangle Park, NC.

Quantification of Nitro- and Hydroxylated Nitro-Aromatic/Polycyclic Aromatic Hydrocarbons in Selected Ambient Air Daytime Winter Samples. Journal article.

Battelle, Columbus, OH.
M. G. Nishioka. c1992, 11p EPA/600/J-92/420
Pub. in Atmospheric Environment, v28A n11 p2077-2087 May 92. Sponsored by Health Effects Research Lab., Research Triangle Park, NC.

Two ambient air samples, both collected in a northern latitude city during winter daytimes, are compared here with regard to NO₂-AR/PAH levels and OH-NO₂-AR levels from filter and XAD-2 extracts. Detection of a previously unreported environmental constituent, tentatively identified as a NO₂-azulene isomer, is discussed. The levels of the OH-NO₂-AR were, in general, at least 4 times higher than levels of the corresponding NO₂-AR. As with NO₂-AR/PAH, OH-NO₂-AR appear to be both primary source emissions and

secondary photochemical products. The filter-collected para-substituted OH-NO₂-AR in these samples appear to be the source emissions, while the XAD-collected ortho- and para-substituted OH-NO₂-AR may be products of photochemical reactions. Other pollutant and meteorological data, including NO, NO₂, HONO, sunlight intensity and fine-particle Pb and K concentrations, are also used to discuss differences between these samples. (Copyright (c) 1992 Pergamon Press Ltd.)

Keywords: *Air pollution sampling, *Aromatic compounds, *Aromatic polycyclic hydrocarbons, *Nitrogen organic compounds, Photochemical reactions, Meteorological data, Urban areas, Hydroxyl radicals, Nitrogen oxides, Solar radiation, Chemical reactions, Winter, Day, Reprints.

PB93-141208/REB PC A03/MF A01
Health Effects Research Lab., Research Triangle Park, NC.

Generation of Mutagenic Transformation Products during the Irradiation of Simulated Urban Atmospheres. Journal article.

NSI Technology Services Corp., Research Triangle Park, NC.

T. E. Kleindienst, D. F. Smith, E. E. Hudgens, L. D. Claxton, and J. J. Bufalini. c1992, 12p EPA/600/J-92/421

Pub. in Environmental Sciences and Technology, v26 n2 p320-329 May 92. See also PB90-259870, PB89-207161 and PB87-199675. Sponsored by Health Effects Research Lab., Research Triangle Park, NC.

Mixtures of air pollutants simulating urban atmospheres were irradiated in a smog chamber, and the resultant products were monitored for the production of mutagenic and other hazardous compounds. The production of biologically active compounds was detected through use of the Ames mutagenicity assay with *Salmonella typhimurium*, strain TA100. Irradiations of the pollutant mixture were conducted at HC/NO_x ratios of 20 and 11. Overall, the mutagenicity of the products and the formation of oxygenated primary and secondary reactions products were greater for the simulations with the higher initial HC/NO_x value. The origin of the mutagenicity from the reactant mixture was examined by conducting experiments with individual paraffinic, olefinic, and aromatic hydrocarbons. The chemicals examined during this aspect of the study were the paraffin n-butane, the olefin propylene, and the aromatic toluene. For the conditions studied, the activity of the toluene products was generally greater than that of propylene or n-butane, and the propylene products showed greater activity than did the n-butane products. The production of n-butane products was generally limited by its low rate of reaction with hydroxyl radicals. Photooxidation products from secondary reactions were most important in the toluene and propylene systems. (Copyright (c) 1992 American Chemical Society.)

Keywords: *Air pollution sampling, *Mutagens, *Photochemical reactions, *Urban areas, *Biological effects, Smog, Test chambers, Irradiation, Urban areas, Biological effects, Volatile organic compounds, Bioassay, Mutagen screening, Nitrogen oxides, Microorganisms, Hydrocarbons, Reprints, Chemical reaction mechanisms.

PB93-141216/REB PC A02/MF A01
V(D)J Recombinase-Mediated Deletion of the 'hprt' Gene in T-Lymphocytes from Adult Humans. Journal article.

Health Effects Research Lab., Research Triangle Park, NC.

J. C. Fuscoe, L. J. Zimmerman, K. Harrington-Brock, L. Burnette, and M. M. Moore. c1992, 10p EPA/600/J-92/422

Pub. in Mutation Research, v283 n1 p13-20 Sep 92. Prepared in cooperation with Environmental Health Research and Testing, Inc., Research Triangle Park, NC., and Vermont Univ., Burlington. Genetics Lab.

The hprt T-cell cloning assay allows the detection of mutations occurring in vivo in the hypoxanthine guanine phosphoribosyltransferase (hprt) gene of T-lymphocytes. In the report, we examined a collection of 314 hprt-deficient clones derived from adult humans for evidence that the mutations were caused by the illegitimate activity of V(D)J recombinase by analyzing exons 2+3 deletion mutations. DNA sequence analysis of deletion breakpoint junctions showed that eight

of the mutations were the result of V(D)J recombinase activity. The frequency of the recombinase-mediated mutations was similar in the adults and newborns (2-4 x 10 to the power of -7). Unregulated expression of V(D)J recombinase activity may be an important mechanism for genomic rearrangements in the genesis of cancer.

Keywords: *Hypoxanthine phosphoribosyltransferase, *T-lymphocyte gene rearrangement, *Mutagenesis, *Chromosome deletion, Base sequence, DNA mutational analysis, Mutations, Gene expression, Exons, Lymphocytes, Polymerase chain reaction, Southern blotting, Adults, Clone cells, Newborns, Reprints, *V(D)J recombinase.

PB93-141224/REB PC A02/MF A01
Large Deletions are Tolerated at the 'hprt' Locus of In vivo Derived Human T-Lymphocytes. Journal article. Health Effects Research Lab., Research Triangle Park, NC. Genetic Toxicology Div. J. C. Fuscoe, L. J. Zimmerman, K. Harrington-Brock, and M. M. Moore. c1992, 10p EPA/600/J-92/423. Pub. in Mutation Research, v283 n4 p255-262 Dec 92. Prepared in cooperation with Environmental Health Research and Testing, Inc., Research Triangle Park, NC.

A cloning assay was used to recover hypoxanthine phosphoribosyltransferase (hprt) T-lymphocytes from adult human males. Analysis of crude cellular extracts by polymerase chain reactions (PCRs) demonstrated that 8% (18/218) of the hprt mutations were due to total deletion of the hprt gene. Fourteen of the 18 mutants were examined by PCR for the presence of flanking DNA to determine the extent of the deletions. The largest deletions were greater than 15 times the size of the hprt gene.

Keywords: *Mutagenesis, *Hypoxanthine phosphoribosyltransferase, *T-lymphocyte gene rearrangement, *Chromosome deletion, Polymerase chain reaction, DNA mutational analysis, Mutations, Cultured cells, Clone cells, T-lymphocytes, Reprints.

PB93-141232/REB PC A02/MF A01
Attenuation of Alcohol Consumption by MDMA (Ecstasy) in Two Strains of Alcohol-Preferring Rats. Journal article. Environmental Protection Agency, Research Triangle Park, NC. Neurotoxicology Div. A. H. Rezvani, P. L. Garges, D. B. Miller, and C. J. Gordon. c1992, 10p EPA/600/J-92/424. Pub. in Pharmacology Biochemistry and Behavior, v43 n1 p103-110 Sep 92. Prepared in cooperation with North Carolina Univ. at Chapel Hill.

Alcohol preference and manifestation of alcoholism are thought by many to be associated with serotonin (5-HT) dysfunction in the brain. Thus, experiments were performed to determine the effect of acute and sub-chronic administration (s.c.) of + or - 3,4-methylenedioxymethamphetamine (MDMA), an amphetamine analog which stimulates 5-HT release, on alcohol preference in two strains of alcohol preferring rats, the Fawn-Hooded (FH) and alcohol preferring (P) rats. Our results show that a single administration of 5.0 mg/kg MDMA significantly decreased ethanol intake in both FH and P rats and increased water intake. Sub-chronic administration of 5.0 mg/kg MDMA for three consecutive days significantly attenuated alcohol intake in both strains.

Keywords: *Alcohol drinking, *Amphetamines, *Serotonin, Rats, Water consumption, Body temperature, Drinking behavior, Alcoholism, Reprints, *Methylenedioxymethamphetamine.

PB93-141240/REB PC A03/MF A01
Subacute Ethanol Consumption Reverses p-Xylene-Induced Decreases in Axonal Transport. Journal article. Environmental Protection Agency, Research Triangle Park, NC. Neurotoxicology Div. S. Padilla, D. L. Lyerly, and C. N. Pope. c1992, 11p EPA/600/J-92/425. Pub. in Toxicology, v75 n2 p159-167 Nov 92. Prepared in cooperation with Burroughs Wellcome Co., Research Triangle Park, NC, and Northeast Louisiana Univ., Monroe. Toxicology Program.

Organic solvents, as a class, have been implicated as neurotoxic agents in humans and laboratory animals. The study was designed to assess the interaction between subacute ingestion of moderate levels of ethanol and the p-xylene-induced decreases in protein and glycoprotein synthesis and axonal transport in the rat optic system. The results indicated that animals maintained on 10% ethanol as a drinking liquid show less p-xylene-induced neurotoxicity than animals receiving no ethanol supplement.

Keywords: *Toxicology, *Xylenes, *Ethyl alcohol, *Axons, *Nervous system, Rats, Neurons, Protein synthesis, Environmental exposure, Reprints, *Axonal transport.

PB93-141257/REB PC A02/MF A01
Synergistic and Antagonistic Effects on Genotoxicity of Chemicals Commonly Found in Hazardous Waste Sites. Journal article Aug 87-Jun 91. Western Illinois Univ., Macomb. Dept. of Biological Sciences. T. H. Ma, S. S. Sandhu, Y. Peng, T. D. Chen, and T. W. Kim. c1992, 9p EPA/600/J-92/426. Contract EPA-7D4127NAEX. Pub. in Mutation Research, v270 n1 p71-77 Nov 92. Sponsored by Health Effects Research Lab., Research Triangle Park, NC. Genetic Toxicology Div.

Synergistic and antagonistic effects on genotoxicity of mixtures of four chemicals; i.e., lead tetraacetate (LTA), arsenic trioxide (ATO), dieldrin (DED), and tetrachloroethylene (TCE), were evaluated by the Tradescantia-micronucleus (Trad-MCN) assay. The chemicals were mixed in ratios of 1:1, 1:2 and 2:1 for mixtures of two chemicals and 1:1:1 each for three chemicals. The concentration of stock solution of these chemicals was around the minimum effective dose (MED) or below the MED for these chemicals as reported by Sandhu et al. (1989). Treatments were applied to plant cuttings by hydroponic uptake of the mixed solutions through the stems of the plant for 30 h followed by fixation of the flower buds in aceto-alcohol (1:3 ratio) without a recovery period. Microslides were prepared for scoring MCN frequencies. Results of two series of repeated experiments indicated that all mixtures of LTA/ATO exhibited antagonistic effects. On the other hand, all mixtures of TCE and DED exhibited synergistic effect. These data indicate that for evaluating biological hazards at chemical waste sites, it is prudent to evaluate the genotoxicity of complex chemical mixtures as these exist in nature because the biological effects based on evaluating individual chemicals may not be true predictors of the interactive effects of the pollutants. (Copyright (c) 1992 Elsevier Science Publishers B. V.)

Keywords: *Mutagens, *Soil contamination, *Hazardous waste sites, Tables(Data), Dose-response relationships, Micronucleus tests, Arsenic oxides, Dieldrin, Tetrachloroethylene, Chemical reactions, Reprints, Tradescantia, Lead tetraacetate.

PB93-141265/REB PC A02/MF A01
Paraoxon Toxicity Is Not Potentiated by Prior Reduction in Blood Acetylcholinesterase. Journal article. Environmental Protection Agency, Research Triangle Park, NC. Neurotoxicology Div. S. Padilla, V. C. Moser, C. N. Pope, and W. S. Brimjoin. c1992, 8p EPA/600/J-92/427. Pub. in Toxicology and Applied Pharmacology, v117 p110-115 Nov 92. Prepared in cooperation with ManTech Environmental Technology, Inc., Research Triangle Park, NC., Northeast Louisiana Univ., Monroe. Toxicology Program, and Mayo Clinic, Rochester, MN. Dept. of Pharmacology.

The role of blood acetylcholinesterase in moderating the effects of organophosphate challenge in rats were tested. Adult male rats (n=42) were injected (i.v.) either with monoclonal antibodies (MAb) to rat acetylcholinesterase (EC 3.1.1.7; AChE) or normal mouse IgG (controls). Two days later, the rats were injected (s.c.) with a mild dosage of paraoxon (0.17 mg/kg), a moderate dosage (0.34 mg/kg) or with vehicle. MAb treatment reduced whole blood and plasma AChE activity by 32% and 90%, respectively, but did not affect neurobehavioral parameters or the AChE activity of brain or diaphragm. The paraoxon challenge produced dose-related neurobehavioral changes and inhibition of brain and diaphragm AChE activity to the same

extent in IgG and MAb treated rats. Thus, significant loss in blood AChE alone produced no detectable neurobehavioral deficits and did not alter the subsequent responses to paraoxon challenge.

Keywords: *Toxicity, *Paraoxon, *Cholinesterase inhibitors, *Monoclonal antibodies, *Organophosphorus compounds, Pesticides, Rats, Brain, Blood, Diaphragm, IGG, Reprints.

PB93-141273/REB PC A03/MF A01
Photo-Oxidation of Automobile Emissions: Measurements of the Transformation Products and Their Mutagenic Activity. Journal article. Health Effects Research Lab., Research Triangle Park, NC. T. E. Kleindienst, D. F. Smith, E. E. Hudgens, R. F. Snow, and E. Perry. c1992, 15p EPA/600/J-92/428. Pub. in Atmospheric Environment, v28A n16 p3039-3053 Nov 92. See also PB91-228759. Prepared in cooperation with ManTech Environmental Technology, Inc., Research Triangle Park, NC., and Environmental Health Research and Testing, Inc., Research Triangle Park, NC.

Dilute mixtures of automobile emissions were irradiated in a smog chamber and tested for mutagenic activity by using a variant of the Salmonella test. The exhaust was taken from single vehicle, a 1977 Ford Mustang, equipped with a catalytic converter. Irradiated and nonirradiated gas-phase emissions were used in exposures of the bacteria, *Salmonella typhimurium*. The mutagenic activities of extracts from the particulate phase were also measured with the standard plate incorporation assay. (In all experiments only direct-acting mutagenic compounds were measured). The gas-phase data showed increased activity for the irradiated emissions when compared to the nonirradiated mixture, which exhibited negligible activity with respect to the control values. The particulate phase for both the irradiated and nonirradiated mixtures showed negligible activity when results were compared to control values for both strains. However, the experimental conditions limited the amount of extractable mass which could be collected in the particulate phase. Under the experimental conditions of this study, the mutagenic density of the gas-phase component of the irradiated mixture contributed approximately two orders of magnitude more to the total TA100 activity than did the particulate phase. For TA98, the gas-phase component contributed approximately one order of magnitude more. The significance and limitations of the results are discussed.

Keywords: *Exhaust emissions, *Air pollution sampling, *Biological effects, *Photochemical reactions, *Oxidation, *Mutagens, Automobiles, Smog, Mobile pollutant sources, Mutagen screening, Toxicity, Concentration(Composition), Bacteria, Public health, Bioassay, Environmental health, Reprints, Chemical reaction mechanisms, *Salmonella typhimurium*.

PB93-141281/REB PC A03/MF A01
Direct Effects of Ethane Dimethanesulphonate on Epididymal Function in Adult Rats. An In vitro Demonstration. Journal article. ManTech Environmental Technology, Inc., Research Triangle Park, NC. G. L. Klinefelter, N. L. Roberts, and J. D. Suarez. c1992, 16p EPA/600/J-92/429. Contract EPA-68-02-4450. Pub. in Jnl. of Andrology, v13 n5 p409-421 Sep/Oct 92. See also PB91-117572, PB91-144691, PB91-191569 and PB91-207068. Sponsored by Health Effects Research Lab., Research Triangle Park, NC. Reproductive Toxicology Branch.

It was recently demonstrated that the Leydig cell toxicant ethane dimethanesulphonate (EDS) produces multiple effects on the epididymis after a single in vivo exposure. To determine whether any of the perturbations were mediated by a direct action of the compound, we used a novel system for the coculture of epididymal epithelial cells and sperm from the caput epididymidis. This system maintains the morphologic integrity and cell polarity of the epididymal epithelial cells before and during coculture, and the sperm recovered after coculture have intact plasma and acrosomal membranes. In addition, several functions required for epididymal sperm maturation are expressed, including the secretion of protein by the epididymal ep-

ithelium, the association of secreted protein with the plasma membrane of cocultured sperm, and the acquisition of progressive motility by cocultured sperm. In vitro exposure of epididymal epithelial cells and sperm to EDS results in a significant decline in protein secretion by the epithelial cells during coculture, and in particular, a dose-dependent decline in a 36- to 38-kD protein (PI 4.0 to 4.5) and a 34- to 36-kD protein (PI 4.5 to 5.0). Moreover, these and other proteins are not recovered from the sperm membrane of cocultured sperm after EDS treatment. Finally, EDS results in a dose-dependent decline in the percentage of both motile and progressively motile sperm recovered after coculture compared with that of sperm from untreated cocultures. (Copyright (c) American Society of Andrology.)

Keywords: *Toxicity, *Epididymis, Rats, In vitro analysis, Spermatozoa, Sperm motility, Extracellular matrix, Epithelium, Cultured cells, Electron microscopy, Membrane proteins, Reprints.

PB93-141299/REB PC A01/MF A01
Improved Method for Screening cDNA Expression Libraries for DNA-Binding Proteins. Journal article. Health Effects Research Lab., Cincinnati, OH. Genetic Toxicology Div.
c8 Jan 92, 5p EPA/600/J-92/430
Pub. in Biotechniques, v13 n3 p388-392 Sep 92.

The ability to successfully screen a lambda-gt11 complementary DNA expression library for specific gene products that can bind to selected sequences of DNA depends on radioactive double stranded DNA probes with high specific activity. The authors demonstrate here that probes labeled by the polymerase chain reaction are superior to probes made by the Klenow reaction. The use of these PCR-generated probes have facilitated efforts to isolate recombinant phage-containing, putative DNA binding gene products that recognized a 246 base pair transcriptional enhancer region of Rous Sarcoma Virus long terminal repeat.

Keywords: *DNA-binding proteins, *Gene library, *Gene expression, DNA, Polymerase chain reaction, DNA probes, DNA polymerase I, Chickens, Reprints.

PB93-141307/REB PC A03/MF A01
Review of the Literature on Potential Reproductive and Developmental Toxicity of Electric and Magnetic Fields. Health Effects Research Lab., Research Triangle Park, NC.
N. Chernoff, J. M. Rogers, and R. Kavet. c1992, 38p EPA/600/J-92/431
Pub. in Toxicology, v74 n2-3 p91-126 Sep 92. Prepared in cooperation with Electric Power Research Inst., Palo Alto, CA. Environment Div.

The potential of electric and magnetic fields to adversely affect the health of the human population is an issue which continues to receive a great deal of attention in both public and scientific forums. One of the critical issues is the possibility that such fields may adversely affect the reproductive process. The studies are ordered in broad categories based upon both classification of the species studied (i.e. submammalian, mammalian exclusive of man, and human) and the agent used (i.e. extremely low frequency electric, very low frequency electric, and magnetic fields). From our review, we conclude that laboratory experimental and epidemiological results to date have not yielded conclusive data to support the contention that such fields induce adverse reproductive effects under the conditions studied.

Keywords: *Reproduction(Biology), *Electric fields, *Magnetic fields, Humans, Exposure, Fishes, Mammals, Epidemiology, Pregnancy outcome, Occupational exposure, Reprints, *Teratology.

PB93-141315/REB PC A02/MF A01
Olfactory Evoked Responses to Odorous Stimuli of Different Intensities. Journal article. Health Effects Research Lab., Research Triangle Park, NC. Human Studies Div.
J. D. Prah, and V. A. Benignus. c1992, 33p EPA/600/J-92/432
Pub. in Chemical Senses, v17 n4 p417-425 Aug 92. Prepared in cooperation with North Carolina Univ. at Chapel Hill. Dept. of Psychology.

In comparison to other senses, the electrophysiology of olfaction has been little studied in man and some of

the basic paradigms used in the study of the other senses have not yet been widely applied to its study. Basic information such as the effect of stimuli of different intensities on the olfactory evoked potential (OEP) has yet to be presented. To this end, 12 subjects received olfactometrically delivered odorant pulses of toluene at three intensity levels-- 1,600, 8,000, and 16,000 ppm. Data were obtained from three electrode sites, Fz, Cz, and Pz. An ANOVA revealed significant stimulus intensity and site effects. There was no difference in amplitude at the lowest intensities but there was a significant increase in amplitude evoked by the 16,000 ppm stimulus. The amplitudes recorded from Fz differed from those recorded from Pz. No latency differences were found, although there was a trend toward briefer latency with greater stimulus concentration. The OEP responds with increased amplitude to increased stimulus intensity as do evoked responses in other sensory modalities. Stimulus control over the OEP amplitude can be obtained by varying the stimulus intensity. These data are evidence that the common principles of sensory processing can be extended to include the sense of smell.

Keywords: *Evoked potentials, *Smell, *Stimulus(Psychophysiology), *Electrophysiology, Electrodes, Sensory thresholds, Amplitude, Toluene, Humans, Reaction time, Reprints.

PB93-141323/REB PC A02/MF A01
Effect of a Base-Catalyzed Dechlorination Process on the Genotoxicity of PCB-Contaminated Soil. Journal article. Environmental Protection Agency, Research Triangle Park, NC. Office of Research and Development.
D. M. DeMarini, V. S. Houk, A. Kornel, and C. J. Rogers. c1992, 10p EPA/600/J-92/433
Pub. in Chemosphere, v24 n12 p1713-1720 Jun 92.

We evaluated the genotoxicity of dichloromethane (DCM) extracts of PCB-contaminated soil before and after the soil had been treated by a base-catalyzed dechlorination process, which involved heating a mixture of the soil, polyethylene glycol, and sodium hydroxide to 250-350 °C. This dechlorination process reduced by over 99% the PCB concentration in the soil, which was initially 2,200 ppm. The DCM extracts of both control and treated soils were not mutagenic in strain TA100 of *Salmonella*, but they were mutagenic in strain TA98. The base-catalyzed dechlorination process reduced the mutagenic potency of the soil by approximately one-half. The DCM extracts of the soils before and after treatment were equally genotoxic in a prophage-induction assay in *E. coli*, which detects some chlorinated organic carcinogens that were not detected by the *Salmonella* mutagenicity assay. These results show that treatment of PCB-contaminated soil by this base-catalyzed dechlorination process did not increase the genotoxicity of the soil.

Keywords: *Soil contamination, *Polychlorobiphenyl compounds, *Mutagens, Catalysis, *Salmonella*, *Escherichia coli*, Polyethylene glycol, Sodium hydroxide, Bacteriophages, Reprints, *Dechlorination.

PB93-141331/REB PC A02/MF A01
Health Effects of Arsenic in Drinking Water: Research Needs. Journal article. Health Effects Research Lab., Research Triangle Park, NC.
J. R. Fowle. c1991, 10p EPA/600/J-92/434
Pub. in Environmental Geochemistry and Health, v14 n1 p63-68 Mar 92. See also PB92-110360.

Research needed to resolve the uncertainties of cancer risk from ingestion of arsenic in drinking water is described. The recommendations fall into two categories reflecting the areas of greatest uncertainty regarding the assessment of arsenic risk: research on the mechanism of cancer, and research on the metabolism and detoxification of arsenic. The recommendations are discussed in light of risk assessment and risk management issues, stressing the need for scientists to interpret research findings for decision managers. (Copyright (c) Science and Technology Letters 1991.)

Keywords: *Arsenic, *Potable water, *Public health, *Water pollutants, Research, Risk assessment, Ingestion(Biology), Regulations, Reprints.

PB93-141349/REB PC A02/MF A01
Glutamate Neurotoxicity in the Developing Rat Cochlea is Antagonized by Kynurenic Acid and MK-801. Journal article. Health Effects Research Lab., Research Triangle Park, NC.

R. Janssen. c1992, 8p EPA/600/J-92/024
Pub. in Brain Research, v590 n1-2 p201-206, 11 Sep 92. See also PB92-113240 and PB91-233403.

Glutamate (Glu) is neurotoxic in the neonatal rat cochlea, producing hearing impairment which is largely due to the death of spiral ganglion cells, whereas the receptor hair cells are spared. Dendritic processes of the spiral ganglion are postsynaptic to the primary afferent synapse of the auditory system. The experiments reported here were designed to test whether this apparent excitotoxicity can be blocked by Glu antagonists. (Copyright (c) 1992 Elsevier Science Publishers B.V.)

Keywords: *Toxicity, *Cochlea, *Nervous system, *Glutamates, *Kynurenic acid, *Dizocilpine maleate, Ganglia, Hair cells, Afferent neurons, Rats, Newborn animals, Neurotoxins, Reprints, *Glutamate antagonists, *Ototoxicity.

PB93-141356/REB PC A03/MF A01
Health Effects Research Lab., Research Triangle Park, NC. Environmental Toxicology Div.
Dermal Absorption of Chemicals: Effect of Application of Chemicals as a Solid, Aqueous Paste, Suspension, or in Volatile Vehicle. Journal article. ManTech Environmental Technology, Inc., Research Triangle Park, NC.
M. F. Hughes, S. P. Shrivastava, M. R. Sumler, B. C. Edwards, and J. H. Goodwin. c1992, 16p EPA/600/J-92/436
Contract EPA-68-02-4450
Pub. in Jnl. of Toxicology and Environmental Health, v37 n1 p57-71 Aug 92. Sponsored by Health Effects Research Lab., Research Triangle Park, NC. Environmental Toxicology Div.

The purpose of the study was to investigate the dermal absorption of chemicals applied to female F344 rats in different physical forms. These forms included chemical as a solid, aqueous paste, suspension or dissolved in the volatile vehicle ethanol. The chemicals investigated were radiolabeled 2-sec-butyl-3,5-dinitrophenol (DNBP), 2,4,5,2',4',5'-hexachlorobiphenyl (HCB) and 3,4,3',4'-tetrachlorobiphenyl. The chemicals were applied on the clipped mid-dorsal region of the rat over a 2.54 cm² area and occluded. Urine and feces were collected and assayed for radioactivity. The animals were sacrificed 120 hr post-treatment by exsanguination. Radioactivity in the blood, skin (treated and untreated) and carcass was assayed. Dermal absorption of DNBP-derived radioactivity was approximately 50% of the recovered dose after application in the four physical forms and the major route of excretion was via the urine. The data indicate that for each chemical studied, dermal absorption occurs equally as well regardless of physical form.

Keywords: *Absorption(Biology), *Skin(Anatomy), *Dinitrophenols, *Polychlorobiphenyl compounds, Urine, Feces, Ethanol, Rats, Graphs(Charts), Tables(Data), Reprints.

PB93-141364/REB PC A03/MF A01
Analysis of X-ray-induced HPRT Mutations in CHO Cells: Insertion and Deletions. Journal article. Health Effects Research Lab., Research Triangle Park, NC.
J. C. Fuscoe, L. J. Zimmerman, A. Fekete, R. W. Setzer, and B. J. F. Roelster. c1992, 15p EPA/600/J-92/437
Pub. in Mutation Research, v269 n2 p171-183 Oct 92. Prepared in cooperation with Environmental Health Research and Testing, Inc., Research Triangle Park, NC., Semmelweis Univ. of Medicine, Budapest (Hungary), and Baylor Coll. of Medicine, Houston, TX.

Molecular alterations were examined in the hypoxanthine guanine phosphoribosyltransferase (hprt) gene of 41 independent X-ray-induced thioquinine-resistant (TGR) Chinese hamster ovary (CHO) cell clones. Rapid screening of the clones by multiplex polymerase chain reaction (PCR) for the presence or absence of exons revealed that the bases for the mutant phenotype were total gene deletion (26/41), partial gene deletion (4/41), and an insertion (1/41). Southern blot analysis confirmed the deletion data and revealed an

additional class of mutants that had a gene disruption but retained all hprt exons (2/41). In addition, the DNA sequence of the insertion mutation was determined.

Keywords: *Mutagenesis, *X-ray irradiation, *DNA damage, *Hypoxanthine phosphoribosyltransferase, CHO cells, DNA mutational analysis, Mutations, Base sequence, Gene expression, Polymerase chain reaction, Southern blotting, Exons, Genetic recombination, Chromosome deletion, Reprints.

PB93-141372/REB PC A02/MF A01
Health Effects Research Lab., Research Triangle Park, NC. Carcinogenesis and Metabolism Branch.
DNA Adducts and Induction of Sister Chromatid Exchanges in the Rat Following Benzo(b)-Fluoranthene Administration. Journal article.
Environmental Health Research and Testing, Inc., Research Triangle Park, NC.
J. A. Ross, G. B. Nelson, K. L. Holden, A. D. Kligerman, and G. L. Erexson. c1992, 6p EPA/600/J-92/438
Contract EPA-68-02-4456, Grant EPA-R-816185
Pub. in Jnl. of Carcinogenesis, v13 n10 p1731-1734 Oct 92. Prepared in cooperation with Kentucky Univ., Lexington. Sponsored by Health Effects Research Lab., Research Triangle Park, NC. Carcinogenesis and Metabolism Branch.

Benzo(b)fluoranthene (B(b)F) was administered (100 mg/kg by i.p. injection) to male Sprague-Dawley rats. Lungs, livers, and peripheral blood lymphocytes (PBLs) were harvested 1, 3, 5, 7, 14, 28, and 56 days after treatment. Several DNA adducts were observed in each tissue, with maximal levels occurring at about 7 days after treatment. Lung DNA exhibited consistently higher adduct levels than liver or PBL DNA. No significant differences were observed between tissues in the types of adducts produced. Sister chromatid exchanges (SCEs) from whole blood cultures were significantly increased relative to concurrent controls between 1 and 14 days after B(b)F administration, with maximum levels at 14 days.

Keywords: *Carcinogenesis, *Toxicology, *Aromatic polycyclic hydrocarbons, *Sister chromatid exchange, *DNA damage, Rats, Lymphocytes, Lung, Liver, Reprints, *Benzo(b)fluoranthene, *DNA adducts.

PB93-141380/REB PC A02/MF A01
Application of the 'Tradescantia micronucleus' Assay for the Genetic Evaluation of Chemical Mixtures in Soil and Aqueous Media. Journal article.
Health Effects Research Lab., Research Triangle Park, NC.
B. S. Gill, and S. S. Sandhu. c1992, 7p EPA/600/J-92/439
Pub. in Mutation Research, v270 n1 p65-69 Nov 92. Prepared in cooperation with Environmental Health Research and Testing, Inc., Research Triangle Park, NC.

Genotoxic evaluation of nine binary and one tertiary mixtures of arsenic trioxide, dieldrin, and lead tetraacetate were performed using the Tradescantia micronucleus (Trad-MN) assay. The chemical mixtures were either (1) mixed into soil, and chemical exposure to the target cells was through the roots of intact plants grown in the soil or (2) through stem cuttings in which the inflorescences were treated with an aqueous solution of the test chemicals. Clastogenic responses were obtained for six out of the ten chemical mixtures, irrespective of the treatment conditions although relatively higher frequencies of MN were observed in plants exposed to the test chemicals in soil. The clastogenicity of the chemical mixtures was modified by the ratio of the individual chemical in a particular mixture. The results of this study suggest that in addition to its utility for monitoring the presence of clastogens in ambient air and water, the Trad-MN assay also be used as a reliable test system for detecting the levels of clastogens in soil.

Keywords: *Micronucleus tests, *Mutagens, *Soil contamination, *Water pollution effects (Plants), Arsenic oxides, Dieldrin, Reprints, *Tradescantia, Lead tetraacetate.

PB93-141398/REB PC A01/MF A01
PCR Primers Specific for Detection of a Rat Repetitive Sequence. Journal article.
Health Effects Research Lab., Research Triangle Park, NC. Carcinogenesis and Metabolism Branch.

M. J. Mass, and B. C. Roop. c1992, 4p EPA/600/J-92/440
Pub. in BioTechniques, v13 n5 p676-678 Nov 92.

Identification of a new oncogene is often accomplished by transfection of genomic DNA of interest into a host of a different species that can respond to the altered phenotype. We report a method for tracking and identifying potential genes of interest that are derived from rat DNA. We used polymerase chain reaction to amplify specifically the rat long-interspersed repetitive sequences in mouse cells that were transfected with rat DNA.

Keywords: *Polymerase chain reaction, *Nucleic acid repetitive sequences, *Molecular cloning, Rats, Mice, Cultured cells, Transfection, DNA probes, Reprints.

PB93-141406/REB PC A01/MF A01
Behavioral Development Following Daily Episodes of Mother-Infant Separation in the Rat. Journal article.
Health Effects Research Lab., Research Triangle Park, NC.
M. E. Stanton, K. M. Crofton, and C. Lau. c1992, 5p EPA/600/J-92/441
Pub. in Fundamental and Applied Toxicology, v19 n3 p474-477 Oct 92.

Sprague-Dawley rat pups were either maternally deprived in warm incubators for 6 hours each day or left alone with their dams, and then tested on a range of endpoints commonly used in developmental neurotoxicity. These included motor activity, olfactory learning and retention, T-maze delayed alternation, acoustic startle response, and auditory thresholds. Interrupting the mother-infant interaction for 6 hours/day had little or no effect by itself on growth and behavioral development.

Keywords: *Toxicology, *Behavior, *Laboratory animal science, *Maternal deprivation, Rats, Mothers, Infants, Neuropsychological tests, Reprints.

PB93-141414/REB PC A02/MF A01
Mechanisms of TCDD-Induction of Cleft Palate: Insights from In vivo and In vitro Approaches. Journal article.
Health Effects Research Lab., Research Triangle Park, NC. Reproductive Toxicology Branch.
B. D. Abbott, J. J. Diliberto, and L. S. Birnbaum. c1992, 6p EPA/600/J-92/442
Pub. in Chemosphere, v25 n1-2 p75-78 Jul 92.

Tetrachlorodibenzo-p-dioxin (TCDD) induced cleft palate (CP) in C57BL/6N embryos by altering proliferation and differentiation of palatal medial epithelial cells. In palatal organ culture, concentration-dependent effects on medial epithelial cells occurred. The mechanism of TCDD activity appears to involve growth factor expression and may interact with retinoic acid and glucocorticoid pathways.

Keywords: *Teratogenic compounds, *Toxicology, *Cleft palate, *Hydrocortisone, *Tretinoin, *Growth substances, *Tetrachlorodibenzodioxin, Cultured cells, Embryos, Congenital abnormalities, Fetal development, In vivo analysis, Palate, Mice, Cell differentiation, In vitro analysis, Reprints, *TCDD.

PB93-141422/REB PC A03/MF A01
Hepatotoxic Interactions of Ethanol with Allyl Alcohol or Carbon Tetrachloride in Rats. Journal article.
Health Effects Research Lab., Research Triangle Park, NC.
E. Berman, D. E. House, J. W. Allis, and J. E. Simmons. c1992, 17p EPA/600/J-92/443
Pub. in Jnl. of Toxicology and Environmental Health 37, n1 p161-176 Aug 92.

To assess interactive toxicity following subacute, concurrent chemical exposure, male Fischer-344 rats, approximately 70 days of age, were given ethanol at 0, 0.05, 0.1, 0.2, or 0.5 ml/kg in corn oil daily by gavage for 14 days (ETOH) group, or the same levels of ethanol with 21 mg of allyl alcohol/kg (ALAC group), or the same levels of ethanol with 20 mg of carbon tetrachloride/kg (CCL4 group). Hepatic response was assessed 24 hr after the last dose. Interactions were evaluated by comparing the ETOH group with either the ALAC group or the CCL4 group using multivariate analysis of variance procedures. No statistically significant

interaction was seen between the ETOH group and the ALAC group at the dosages used.

Keywords: *Toxicity, *Ethyl alcohol, *Allyl alcohols, *Carbon tetrachloride, Liver function tests, Rats, Statistical analysis, Drug delivery systems, Necrosis, Multivariate analysis, Reprints.

PB93-141430/REB PC A03/MF A01
Correlation between Chemical Suppression of Natural Killer Cell Activity in Mice and Susceptibility to Cytomegalovirus: Rationale for Applying Murine Cytomegalovirus as a Host Resistance Model and for Interpreting Immunotoxicity Testing in Terms of Risk of Disease. Journal article.
Health Effects Research Lab., Research Triangle Park, NC. Environmental Toxicology Div.
M. K. Selgrade, M. J. Daniels, and J. H. Dean. c1992, 16p EPA/600/J-92/444
Pub. in Jnl. of Toxicology and Environmental Health 37, n2 p123-137 Sep 92. Prepared in cooperation with Sterling Research Group, Rensselaer, NY. Drug Safety Assessment.

The purpose of the study was to determine the relationship between chemical suppression of natural killer (NK) cell activity in mice and chemical effects on susceptibility to murine cytomegalovirus (MCMV) infection. Data from studies with 8 chemicals administered in various doses and by various routes were evaluated, and a statistically significant correlation was observed between chemical suppression of virus-augmented NK cell activity and increased mortality due to MCMV infection. In contrast, effects of the same chemical treatments on spontaneous NK cell activity (i.e., NK cell activity in uninfected mice) did not correlate with effects of these chemicals on mortality due to MCMV.

Keywords: *Natural killer cells, *Cytomegalic inclusion disease, *Toxicology, *Immunosuppressive agents, *Immunosuppression, Mice, In vivo analysis, Biological models, Reprints.

PB93-141448/REB PC A03/MF A01
Micronuclei and Other Nuclear Anomalies in Buccal Smears: A Field Test in Snuff Users. Journal article.
Health Effects Research Lab., Research Triangle Park, NC. Genetic Toxicology Div.
P. E. Tolbert, C. M. Shy, and J. W. Allen. c1992, 13p EPA/600/J-92/445
Pub. in American Jnl. of Epidemiology, v134 n8 p840-850, 15 Oct 91. See also PB93-141455. Prepared in cooperation with North Carolina Univ. at Chapel Hill. School of Public Health.

A revised protocol for the exfoliated cell micronucleus assay was field-tested in a population exposed to a genotoxic agent at levels associated with a significant increase in cancer risk. The standard assay involves microscope examination of epithelial smears to determine the prevalence of micronucleated cells with separate scoring of other nuclear anomalies associated with cytotoxicity and genotoxicity. Prevalence of micronucleated cells was elevated in the snuff users compared to the non-users. The pattern of relative frequencies of several nuclear anomalies provided strong evidence of a cytotoxic effect of snuff.

Keywords: *Mouth, *Carcinogenesis, *Tobacco, *Micronucleus tests, Smokeless tobacco, Field tests, Risk factors, Genetic markers, Epithelial cells, Chromosome aberrations, Public health, Epidemiologic methods, Reprints, Buccal smears, Snuff.

PB93-141455/REB PC A03/MF A01
Micronuclei and Other Nuclear Anomalies in Buccal Smears: Methods Development. Journal article.
Health Effects Research Lab., Research Triangle Park, NC. Genetic Toxicology Div.
P. E. Tolbert, C. M. Shy, and J. W. Allen. c1992, 11p EPA/600/J-92/446
Pub. in Mutation Research, v271 n1 p69-77 Feb 92. See also PB93-141448. Prepared in cooperation with North Carolina Univ. at Chapel Hill. School of Public Health.

Laboratory work aimed at improving the epidemiologic utility of an innovative genotoxicity marker is described. The exfoliated cell micronucleus assay involves microscope analysis of epithelial smears to de-

termine the prevalence of micronucleation, an indicator of structural or numeric chromosomal aberrations. Exfoliated cells are moribund and undergo degenerative phenomena that can produce extranuclear objects difficult to distinguish from classical micronuclei. We also provide evidence that other nuclear anomalies are at least as common as micronucleation and that, therefore, there is the potential for extensive misclassification.

Keywords: *Mouth, *Carcinogenesis, *Tobacco, *Micronucleus tests, *Smokeless tobacco, Chromosome aberrations, Epidemiologic methods, Genetic markers, Epithelial cells, Public health, Radiation effects, Reprints, Buccal smears, Snuff.

PB93-141463/REB PC A02/MF A01
Health Effects Research Lab., Research Triangle Park, NC. Genetic Toxicology Div.

Application of a Wheat Seedling Assay for Detecting Aneuploidy Induced by N-Ethyl-N-Nitrosourea and 4-Nitroquinoline-1-Oxide. Journal article. North Carolina Central Univ., Durham. Dept. of Biology.

J. S. Dhesei, and S. S. Sandhu. c1992, 9p EPA/600/J-92/447

Contract EPA-68-01-4456

Pub. in *Mutation Research* 270, n1 p79-85 Nov 92. Sponsored by Health Effects Research Lab., Research Triangle Park, NC. Genetic Toxicology Div.

N-ethyl-N-nitrosourea and 4-nitroquinoline-1-oxide were evaluated in the allohexaploid wheat seedling assay for their ability to induce aneuploidy and/or small chromosome deletions. The wheat strain used (Neatby's virens) is homozygous for a pair of recessive alleles (v1) present on chromosome 3B and produces virescent seedlings when grown at temperatures below 26°C. When the germinating embryos are treated with a test chemical, loss of chromosome 3B or its segment bearing the v1 allele produces a green sector in the leaf whereas a gain of this chromosome induces a white sector. Both the test chemicals yielded positive results in this assay. The assay is very simple and can be employed for evaluating the genetic potential of chemicals in a laboratory as well as for in situ hazards assessment under natural environmental conditions.

Keywords: *Wheat, *Aneuploidy, *Ethylnitrosourea, *4-Nitroquinoline-1-oxide, *Seeds, *Toxicity, Chromosomes, Alleles, Risk assessment, Temperature, Dose-response relationships, Reprints.

PB93-141471/REB PC A02/MF A01
In vitro Mammalian Mutagenesis as a Model for Genetic Lesions in Human Cancer. Journal article. Health Effects Research Lab., Research Triangle Park, NC. Genetic Toxicology Div.

J. Hozier, M. Applegate, and M. M. Moore. c1992, 10p EPA/600/J-92/448

Pub. in *Mutation Research* 270, n2 p201-209, 16 Nov 92. Prepared in cooperation with Florida State Univ., Tallahassee. Dept. of Biological Science, and Florida Inst. of Tech., Melbourne. Medical Genetics Lab.

Molecular and cytogenetic analysis of mutations induced by a variety of genotoxic compounds at the heterozygous thymidine kinase locus in mouse lymphoma cells indicates that in vitro assay does indeed register the range of genetic lesions recently found in a wide variety of human tumors. The types and complexity of the induced lesions are reflected in mutant cell colony phenotype in a compound-specific fashion. These studies point to the use of appropriate in vitro mammalian mutagenesis assays as new model systems for dissecting the genetic lesions important to human carcinogenesis, and as a means of determining the potential for compounds to induce such lesions. (Copyright (c) 1992 Elsevier Science Publishers B.V.)

Keywords: *Carcinogenesis, *Toxicology, *Mutagenicity tests, DNA mutational analysis, DNA probes, Cultured cells, Mice, Genetic markers, Genetic models, In vitro analysis, Reprints.

PB93-141489/REB PC A03/MF A01
Mutagenicity of Organic Emissions from Unvented Kerosene Heaters in a Chamber Study. Journal article. Health Effects Research Lab., Research Triangle Park, NC.

J. L. Mumford, J. Lewtas, K. Williams, W. G. Tucker, and G. W. Traynor. c1992, 11p EPA/600/J-92/449

Pub. in *Jnl. of Toxicology and Environmental Health*, v36 n2 p151-159 Jun 92. See also PB91-117119. Prepared in cooperation with Lawrence Berkeley Lab., CA.

A study was conducted to assess the mutagenicity of semivolatile organics and particle-bound organics emitted from unvented kerosene space heaters. The units tested included a well-tuned radiant heater and a maltuned convective heater. The tests were conducted in a 27-cu m chamber, with prescribed on/off heater usage pattern. The organic emissions were collected on teflon-coated glass filters backed by XAD-2 resin. The dichloromethane-extractable organics from both the filters and the XAD were analyzed for nitro-polycyclic hydrocarbons using gas chromatography/mass spectrometry and were bioassayed for mutagenicity in microsome suspension assays using *Salmonella typhimurium* strains TA98 with and without S9, TA98NR (a nitroreductase deficient strain) without S9 and strain TM677 with S9. The results showed that both the semivolatile and particle-bound organics emitted from the kerosene heaters were mutagenic, and the presence of nitropolycyclic hydrocarbons in these organic emissions substantiated these findings.

Keywords: *Environmental health, *Public health, *Toxic substances, *Organic compounds, *Mutagens, Heating equipment, Test chambers, Aromatic polycyclic hydrocarbons, Toxicity, Exposure, Indoor air pollution, Air pollution effects (Humans), Bioassay, Gas analysis, Kerosene, Houses, Reprints.

PB93-141497/REB PC A02/MF A01
Robert S. Kerr Environmental Research Lab., Ada, OK.

Biosorption of Dichlorodiphenyltrichloroethane and Hexachlorobenzene in Groundwater and Its Implications for Facilitated Transport. Journal article. Lund Univ. (Sweden). Dept. of Ecology.

R. Lindqvist, and C. G. Enfield. c1992, 10p EPA/600/J-92/452

Grant EPA-R-812808
Pub. in *Applied and Environmental Microbiology*, v58 n7 p2211-2218 Jul 92. See also PB-241 293. Prepared in cooperation with Rice Univ., Houston, TX. Dept. of Environmental Science and Engineering. Sponsored by Robert S. Kerr Environmental Research Lab., Ada, OK.

The potential for enhanced mobility of hydrophobic pollutants by cotransport with bacteria in saturated soils was evaluated from measurements of biosorption of (14)C-labeled hexachlorobenzene and dichlorodiphenyl-trichloroethane (DDT) to five strains of soil and sewage bacteria. The sorption process could be described by a linear partition equation and appeared to be reversible, but desorption kinetics were slow and/or partly irreversible. The DDT partition coefficients varied with equilibration time, possibly reflecting DDT-induced changes in the physiology of the bacteria. The partition coefficients, normalized to the masses of the bacteria, ranged from 250 to 14,000 for live cells, but the largest coefficients were associated with autoclaved cells of a *Pseudomonas* sp. The sorptive capacity of the bacterial biomass was greater for DDT than for hexachlorobenzene but was not correlated to overall bacterial hydrophobicity, measured by hydrophobic interaction chromatography. In a column study, 1.2×10^9 cells of a *Bacillus* sp. strain per ml enhanced DDT transport about 8-fold, whereas an advective-dispersive-sorptive equilibrium model for two mobile phases, water and free-living bacteria, suggested a 14-fold enhancement, based on the DDT partition coefficient. The disagreement was in part due to a retarded nonequilibrium movement of the bacteria. (Copyright (c) 1992, American Society for Microbiology.)

Keywords: *Chemical water pollutants, *Hexachlorobenzene, *DDT, *Ground water, Soil microbiology, Sewage, Microbial colony count, *Bacillus*, Liquid chromatography, Mathematical models, Reprints, *Chemical transport.

PB93-141505/REB PC A03/MF A01
Robert S. Kerr Environmental Research Lab., Ada, OK.

Cell Density and Non-Equilibrium Sorption Effects on Bacterial Dispersal in Groundwater Microcosms. Journal article.

Rice Univ., Houston, TX. Dept. of Environmental Science and Engineering.

R. Lindqvist, and C. G. Enfield. c1992, 20p EPA/600/J-92/451

Grant EPA-R-812808

Pub. in *Microbial Ecology*, v24 p25-42 Nov 92. Prepared in cooperation with Lund Univ. (Sweden). Sponsored by Robert S. Kerr Environmental Research Lab., Ada, OK.

The relative importance of dispersion, physical straining, nonequilibrium sorption, and cell density on the dispersal of bacteria was examined in saturated, flow-dynamic sand columns. The bacterial breakthrough as a result of different size distributions of sand particles was followed by measuring the effluent concentration of (3)H-adenosine-labelled cells of a *Bacillus* sp. and an *Enterobacter* sp. strain suspended in ground-water. The breakthrough curves were compared with theoretical curves predicted from an advective-dispersive equilibrium sorption model (ADS), an ADS model with a first order sink term for irreversible cell reactions, a two-site model (equilibrium and nonequilibrium sorption sites), and a filtration model. Bacterial sand:water isotherms were linear in the experimental concentration range but had positive intercepts. The partition coefficients ranged from 15 to 0.4 for the *Bacillus* sp., and 120 to 0.4 for a *Pseudomonas* sp., and decreased with increasing particle size of the dominant fraction. In a kinetic study, the partition coefficient for the *Enterobacter* sp. in the smaller particle sand was 63 after one hour, but had decreased to 9 after 19 hours. (Copyright (c) Springer-Verlag New York Inc. 1992.)

Keywords: *Aquatic microbiology, *Ground water, *Aquatic ecosystems, *Bacteria, Soils, Sands, *Bacillus*, *Pseudomonas*, *Enterobacter*, Microbial colony count, Reprints.

PB93-141513/REB PC A03/MF A01
Applied Geologic, Microbiological, and Engineering Constraints of In-situ BTEX Bioremediation. Journal article.

Robert S. Kerr Environmental Research Lab., Ada, OK.

L. G. Kennedy, and S. R. Hutchins. c1993, 27p EPA/600/J-92/450

Pub. in *Remediation*, v3 n1 p83-110 Winter 1992/93. Prepared in cooperation with American Environmental Consultants, Inc., Norman, OK.

An in-situ bioremediation project has been designed and constructed for a site in south-central Kansas just north of Wichita. A pipeline leaked an unknown quantity of refined fuels in the 1970s. The spill was undetected until hydrocarbons were found in a nearby municipal water supply well. Of concern, from a regulatory perspective, are the alkylbenzene components found in the groundwater, including benzene, toluene, ethylbenzene, and xylene (BTEX). Initial abatement procedures, including free product removal and pumping, had become ineffective. In-situ bioremediation was selected to complete the restoration process. The project emphasizes the need for a strong understanding of the geologic and hydrogeologic conditions prevalent under the site. Site studies were conducted to determine the distribution and mass of the contaminant and the hydraulic regime. Laboratory microbial studies were used to determine the efficacy of nitrate as a primary electron acceptor. Information from site studies was used to design a treatment system tailored to the requirements of the site. The treatment system is designed to deliver the maximum amount of nutrient-enriched water to the contaminated zone while maintaining hydraulic control of the site.

Keywords: *Remedial action, *Oil spills, *Water pollution control, *Biological treatment, Microbiology, Ground water, Oil pollution, Pipelines, In-situ processes, Hydrogeology, Fuels, Anaerobic processes, Nutrients, Xylenes, Toluene, Benzene, Aquifers, Reprints, *South Central Region (Kansas), Benzene/ethyl, Cleanup operations.

PB93-141521/REB PC A02/MF A01
Corvallis Environmental Research Lab., OR.

Chemistry of Dissolved Organic Carbon and Organic Acids in Two Streams Draining Forested Watersheds. Journal article.

Illinois Univ. at Urbana-Champaign. Dept. of Forestry.

M. B. David, G. F. Vance, and J. S. Kahl. c1992, 10p EPA/600/J-92/453
Pub. in Water Resources Research, v28 n2 p389-396 Feb 92. Prepared in cooperation with Wyoming Univ., Laramie. Dept. of Plant, Soil, and Insect Sciences, and Maine Univ. at Orono. Dept. of Geological Sciences. Sponsored by Corvallis Environmental Research Lab., OR.

The concentration, major fractions, and contribution of dissolved organic carbon (DOC) to stream chemistry were examined in two paired streams draining upland catchments in eastern Maine. Although SO_4^{2-} was the dominant stream anion, followed by Cl^- , organic anions were also determined to be an important component of these stream waters, especially during storm events. This illustrates that even in streams with low DOC, such as these studied here, organic anions can contribute significantly to stream acidity.

Keywords: *Water chemistry, *Streams, *Acidification, *Water pollution, *Organic acids, Watersheds, Forests, Surface waters, Anions, Storms, Air water interactions, Soil chemistry, Bear Brook, Reprints, *Dissolved organic carbon, Eastern Region(Maine).

PB93-141539/REB PC A02/MF A01
Corvallis Environmental Research Lab., OR.
Kinetics of Chemical Weathering in B Horizon Spodosol Fraction. Journal article.
Iowa Univ., Iowa City. Dept. of Civil and Environmental Engineering.
S. R. Asolekar, R. L. Valentine, and J. L. Schnoor. c1991, 8p EPA/600/J-92/454
Pub. in Water Resources Research, v27 n4 p527-532 Apr 91. See also PB92-143858. Sponsored by Corvallis Environmental Research Lab., OR.

The purpose of this study is to investigate the rate and kinetic formulation of chemical weathering on an isolated fraction of whole soil, specifically, whether the rate of chemical weathering is proportional to a fractional power of the hydrogen ion activity in soil solution, a kinetic formulation that is consistent with a surface-reaction-controlled dissolution mechanism. Weathering experiments were also conducted to investigate the effect of an accumulation of base cations (near saturation for kaolinite) on the weathering rate in the semicontinuous mode of operation of a laboratory pH-stat reactor. (Copyright (c) 1991 by the American Geophysical Union.)

Keywords: *Weathering, *Soil chemistry, *Kinetics, *Hydrogen ions, Air land interactions, pH, Physicochemical properties, Dissolution, Deposition, Acid rain, Geochemistry, Minerals, Surface chemistry, Reprints.

PB93-141547/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Recovery of the Highly Acidified Clearwater Lake Watershed, Ontario, Canada, Simulated with the IL WAS Model. Journal article.
Battelle Pacific Northwest Labs., Richland, WA.
L. E. Eary, E. A. Jenne, L. W. Vail, and D. C. Girvin. c1991, 24p EPA/600/J-92/455
Pub. in Applied Geochemistry, v6 p613-634 1991. Sponsored by Corvallis Environmental Research Lab., OR.

The integrated Lake Watershed Acidification Study (ILWAS) model was used to simulate the recovery of the highly acidified Clearwater Lake, Ontario. These decreases in acidic constituents are in good agreement with monitoring data. Longterm simulations indicate that deacidification may continue until approximately 2020, if S deposition rates remain at or below the 1987 level. The agreement between simulated and monitoring data for the first 10-a of recovery and the simulated long-term recovery of the lake to its pre-smelter level of acidity lend confidence in the capability of numerical models to simulate the reversibility of watershed acidification and suggest that some highly acidic watersheds may eventually recover, given substantial decreases in acid deposition.

Keywords: *Water pollution control, *Clearwater Lake, *Watersheds, *Acidification, *Air water interactions, Long term effects, Air pollution control, Smelting, Acid neutralizing capacity, pH, Deposition, Sulfur, Sulfur oxides, Canada, Reprints, *Integrated Lake Watershed Acidification Study Model, Ontario(Canada).

PB93-141554/REB PC A02/MF A01
Corvallis Environmental Research Lab., OR.
Air-Drying and Pretreatment Effects on Soil Sulfate Sorption. Journal article.
Oregon State Univ., Corvallis. Dept. of Soil Science.
S. D. Comfort, R. P. Dick, and J. Baham. c1991, 8p EPA/600/J-92/456
Pub. in Soil Science Society of American Jnl. 55, p968-973 1991. See also PB87-227468. Sponsored by Corvallis Environmental Research Lab., OR.

Increased attention has been focused on the effects of acid deposition on aquatic and terrestrial ecosystems. In order to predict the fate of atmospheric S and its effects on surface and groundwater chemistry, realistic estimates of SO_4 -sorption capacities of soils are needed. In this study, we report the results of two investigations: the first compared the effects of six soil-sample collection and storage procedures on SO_4 -sorption with the objective of determining which procedure would least alter its sorption characteristics. In the second investigation, our objectives were to determine the impact of air drying on a broad range of soils and to identify the soil physicochemical properties that might affect sorption capacities as a result of soil drying.

Keywords: *Soil analysis, *Sample preparation, *Sulfates, *Land pollution, Drying, Soil chemistry, Physicochemical properties, Air land interactions, Air water interactions, Air pollution, Water pollution, Deposition, Sorption, Reprints, *Air drying.

PB93-141562/REB PC A02/MF A01
Corvallis Environmental Research Lab., OR.
Stable Sulfur Isotopes of Sulfate in Precipitation and Stream Solutions in a Northern Hardwood Watershed. Journal article.
State Univ. of New York Coll. of Environmental Science and Forestry, Syracuse.
A. C. Stam, M. J. Mitchell, H. R. Krouse, and J. S. Kahl. c1992, 9p EPA/600/J-92/457
Pub. in Water Resources Research, v28 n1 p231-236 Jan 92. Prepared in cooperation with Calgary Univ. (Alberta), and Maine Univ. at Orono. Sponsored by Corvallis Environmental Research Lab., OR.

Stable S isotopes of SO_4^{2-} in precipitation, throughfall, and stream water solutions in a northern hardwood watershed (Bear Brook Watershed, Maine) were examined to determine sources of stream SO_4^{2-} and to identify watershed processes that may affect atmospherically deposited SO_4^{2-} prior to reaching the streams. Similarity among temporal pattern in $\Delta(34)\text{S}$ of precipitation, throughfall, stream SO_4^{2-} (range: +3.4 to 9.4‰), and SO_4^{2-} (marine)/(SO_4^{2-} (total)) of stream SO_4^{2-} (5-10‰) indicated that the $\Delta(34)\text{S}$ of stream SO_4^{2-} were controlled principally by atmospheric deposition. Lack of correlation between $\Delta(34)\text{S}$ of stream SO_4^{2-} and stream (SO_4^{2-} (total)), elevational position, and stream discharge supported the interpretation that fractionation of stable S isotopes within the watershed appeared to have, at most, a minor influence on $\Delta(34)\text{S}$ of stream SO_4^{2-} . (Copyright (c) 1992, American Geophysical Union.)

Keywords: *Sulfur isotopes, *Stable isotopes, *Precipitation(Meteorology), Hardwoods, *Watersheds, Forest land, Sulfates, Hydrogeology, Hydrogeochemistry, Geochemical cycles, *Acidification, Rainfall, Acidity, Snowmelt, Runoff, Air pollution, Maine, *Watershed Manipulation Project.

PB93-141570/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Characterizing the Distribution of Observed Precipitation and Runoff over the Continental United States. Journal article.
ManTech Environmental Technology, Inc., Corvallis, OR.
J. Dolph, and D. Marks. c1992, 23p EPA/600/J-92/458
Contract EPA-68-C8-0000
Pub. in Climate Change, v22 p99-119 1992. See also PB90-120072. Sponsored by Corvallis Environmental Research Lab., OR.

The paper describes the development of a comprehensive geographic data-base of historic precipitation and runoff measurements for the conterminous U.S. The database is used in a spatial analysis to characterize large scale precipitation and runoff patterns and to assess the utility and limitations of using historical

hydro-meteorological data for providing spatially distributed precipitation estimates at regional and continental scales. Long-term annual average precipitation and runoff surfaces generated from interpolation of point measurements are used in a distributed water balance calculation to check the reliability of precipitation estimates. The incorporation of high elevation snow measurements into the precipitation record significantly improves the water budget estimates in some areas and enhances the utility of historical data for providing spatially distributed precipitation estimates in topographically diverse regions. The research establishes a database for continental scale studies and provides direction for the successful development of spatially distributed, regional scale water balance models.

Keywords: *United States, *Precipitation(Meteorology), *Runoff, *Rainfall-runoff relationships, Climates, Data collection, Spatial distribution, Study estimates, Hydrology, Meteorology, Snowmelt, Rainfall, Topography, Regional analysis, Water balance, Reprints.

PB93-141687/REB PC A03/MF A01
PR Notice 87-1. Notice to Manufacturers, Formulators, Producers and Registrants of Pesticide Products.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Mar 87, 18p EPA/540/09-93/246
See also PB93-141695. Portions of this document are not fully legible.

The notice describes the label improvement program for pesticides registered under Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and applied through irrigation systems (also known as chemigation). The notice explains the program, defines who and what the notice applies to, and details about how the labeling is to be done. These label changes are necessary to prevent unnecessary human or animal exposure to the pesticide.

Keywords: *Pesticides, *Labels, *Irrigation, Marking, Toxicity, Pollution control, Agricultural wastes, Regulations, Ecology, Public health, Irrigation systems, Irrigation effects, Federal Insecticide Fungicide and Rodenticide Act, *Chemigation, Pesticide residues.

PB93-141695/REB PC A03/MF A01
PR Notice 87-4. Notice to Manufacturers, Formulators and Registrants of Pesticides.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Mar 87, 29p EPA/540/09-93/249
See also PB93-141687.

The notice is intended for people responsible for federal registrations of pesticides registered for forest uses or for control or eradication of mosquito larvae. The notice describes the measures pesticide users must take to prevent unnecessary pesticide exposure to endangered and threatened species. A listing of U.S. Fish and Wildlife field offices (including phone numbers) to contact regarding usage restrictions for each of the affected pesticides is included. Two appendices which have additional information are included.

Keywords: *Pesticides, *Labels, Pollution control, Endangered species, Marking, Utilization, Toxicity, Regulations, Habitats, Ecology, Listings, Pesticide residues, *Larvicides, Threatened species, Federal Insecticide Fungicide and Rodenticide Act.

PB93-142016/REB PC A18/MF A04
Environmental Protection Agency, Research Triangle Park, NC. Control Technology Center.
Evaluation and Costing of NOx Controls for Existing Utility Boilers in the NESCAUM Region.
Acurex Environmental Corp., Mountain View, CA.
C. Castaldini. Dec 92, 414p EPA/453/R-92/010
Contract EPA-68-D9-0131
Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Control Technology Center, and Northeast States for Coordinated Air Use Management, Boston, MA.

The Technical Report discusses NOx controls for utility boilers in the Northeast States for Coordinated Air Use Management (NESCAUM) region. The document discusses: Utility boiler population profile in the NES-

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CAUM region; Uncontrolled NOx emissions and factors that affect NOx emissions; Available NOx controls and their levels of performance; Cost methodology for determining the costs of NOx controls; Costs and cost effectiveness of NOx controls; and impacts of NOx controls on combustible emissions.

Keywords: *Boilers, *Air pollution control, *Nitrogen oxides, Cost effectiveness, Combustion products, Flue gases, Hydrocarbons, Age, Catalytic converters, Retrofitting, Performance evaluation, Fuel oils, Environmental impacts, Design, Public utilities, Northeast Region(United States), Reburning, Coal fired boilers.

PB93-142107/REB PC A03/MF A01
Environmental Protection Agency, Washington, DC. Office of Environmental Engineering and Technology Demonstration.

Federal Policies and Technological Problem-Solving.

Veblen Society, Inc., Gaithersburg, MD.
G. Soergel, c1992, 42p

See also PB92-106731. Sponsored by Environmental Protection Agency, Washington, DC. Office of Environmental Engineering and Technology Demonstration.

The Report addresses the question: of whether existing policies either enhance or inhibit the achievement of a new policy's primary objective; namely, to solve public interest problems at the least cost and risk to taxpayers. (See: 'How to Motivate Private Investment in Public Goods', NTIS Accession No. PB92-106731). The Report's Appendix briefly describes the new policy and its several techno-economic objectives. Only two existing policies are analyzed: OMB Circular 76, 'Performance of Commercial Activities,' and Federal Acquisition Regulations (FARs). The Report concludes that both policies are irrelevant to the new policy since neither enhances nor inhibits achievement of the new policy's objectives, and that a new federal policy is needed to cost-effectively solve the Environmental Protection Agency's (EPA's) ecological and environmental preservation problems.

Keywords: *Government policies, *Problem solving, Acquisition, Research and development, Ecology, Environment management, Conservation, Regulations, *US EPA.

PB93-142115/REB PC A02/MF A01
Novel Approach for Gathering Data on Solvent Cleaning.

Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. M. A. Serageldin, J. C. Berry, and D. I. Salman. May 92, 9p EPA/600/R-92/131

Cleaning is done in industry for different purposes: to maintain industrial equipment and work areas; to remove contaminants such as dirt and process materials from the interior of process equipment; and to prepare surfaces before the next stage in a process. Cleaning tools and removable parts also require cleaning. As a result of these activities solvents containing volatile organic compounds (VOCs) are evaporated into the atmosphere, contributing to the air quality problem. A number of solvents used are classified as hazardous air pollutants in Section 112 of the Clean Air Act Amendments (CAAA). The purpose of this paper is to discuss a methodology to determine accurate VOC emissions from cleaning. It is founded on the concept of a 'unit operation system (UOS),' which was developed to define the emission streams that need to be considered for a material balance. The focus, for the purpose of the material balance, is the 'unit operation' being cleaned.

Keywords: *Pollution regulations, *Cleaning, *Solvents, *Air pollution abatement, *Volatile organic compounds, Material balance, Clean Air Act, Air quality data, Data collection, Pollution sources, Environmental management, Fugitive emissions, Emission factors, Industrial plants, Unit operation system, Cleanup operations.

PB93-142420/REB PC A03/MF A01
National Sea Grant Coll. Program, Silver Spring, MD. **Shoreline Erosion Control Using Marsh Vegetation and Low-Cost Structures.**

North Carolina State Univ. at Raleigh. Sea Grant Coll. Program. S. W. Broome, S. M. Rogers, E. D. Seneca, and C. B. Burgess. 1992, 23p UNC/SG-92/12

Grant NA90AA-D-SG062
See also PB82-194176. Sponsored by National Sea Grant Coll. Program, Silver Spring, MD.

Erosion is a serious threat to waterfront property along most of North Carolina's extensive estuarine shoreline. It is accelerated by man's intensive use and mismanagement. As demand for shoreline property increases -- for homesites, recreational areas, marinas and industrial sites -- its value increases, and landowners become more concerned about loss of land to erosion. There is a variety of erosion-control methods -- some beneficial, some useless and others that are even detrimental. Structural methods such as bulkheads, groins, revetments and riprap are often effective. But they are expensive to build and maintain and may have adverse environmental effects. Establishing vegetation is much cheaper than structural methods of erosion control, and the new marsh provides habitat, food and nutrients for organisms in the surrounding estuarine waters.

Keywords: *Erosion control, *Shore protection, *Vegetation establishment, *Structural engineering, *Estuaries, Cost effectiveness, North Carolina, Man environment interactions, Alternatives, Salt marshes, Land development, Grasses.

PB93-143691/REB PC A08/MF A02
Proceedings of the 1989 Midwest Pollution Control Biologists Meeting. Held in Chicago, Illinois on February 14-17, 1989. Final rept.

Environmental Protection Agency, Chicago, IL. Region V. W. S. Davis, and T. P. Simon. Oct 89, 161p EPA/905/9-89/0087

The report is a compilation of 15 papers representing a portion of the 1989 presentations delivered at the Midwest Pollution Control Biologists Meeting, Chicago, IL, February 14-17, 1989. Papers include technical research concerning organism groups, program development, and a summary of the meeting.

Keywords: *Research projects, *Benthos, *Water pollution control, *Meetings, Hazardous materials, Technology transfer, Fisheries, Invertebrates, Sampling, Measurement, Correlation, Insects, Tables(Data), Plankton, Sediments, Toxicity, Tests.

PB93-143709/REB PC A08/MF A02
Environmental Protection Agency, Seattle, WA. Region X.

Restoration of the Salmon River Salt Marshes: Retrospect and Prospect. Final rept.

Oregon State Univ., Corvallis. Dept. of Geosciences. R. E. Frenkel, and J. C. Morlan. 15 Feb 90, 156p EPA/910/9-92/012
Sponsored by Environmental Protection Agency, Seattle, WA. Region X.

In 1978 the U.S. Forest Service breached a dike on the north shore of the Salmon River estuary to reestablish a natural salt marsh in a diked pasture. Diane L. Mitchell, a graduate student at Oregon State University, initiated a detailed study of the restoration of the salt marsh ecosystem in 1977. In her work, completed in 1981, Mitchell collected base line data, established an intensive sampling system of permanent plots in the diked pasture and flanking 'intact' control marshes, and analyzed restoration progress from 1978 to 1980. This report continues Mitchell's earlier research by evaluating the composition, structure, function, and long term prospects for the restored wetland. It also summarizes the status of the restoration in 1988, eleven years after dike removal, and discusses prospects for total restoration to conditions prevailing prior to human alterations.

Keywords: *Tidewater, *Salt marshes, *Salmon River, *Wetlands, *Aquatic ecosystems, Evaluation, Field tests, Vegetation, Species diversity, Coastal regions, Resources management, Pasture, Estuaries, *Restoration, Pacific Northwest Region(United States).

PB93-143717/REB PC A07/MF A02
Proceedings of the National Workshop on Biological Criteria (1st). Held in Lincolnwood, Illinois on December 2-4, 1987. Final rept.

Environmental Protection Agency, Chicago, IL. Region V. T. P. Simon, L. L. Holst, and L. J. Shepard. Dec 88, 138p EPA/905/9-89/003

A compilation of 15 papers representing a portion of presentations delivered at the 1987 National Biocriteria Workshop in Lincolnwood, Illinois, December 2-4, 1987. Papers include state perspectives, methodological, and technical issues which directly impact the implementation of biological assessment and criteria.

Keywords: *Meetings, *Biological effects, *Water pollution effects, *Aquatic biology, *Biological indicators, Clean Water Act, Pollution regulation, Water quality, Surface waters, Aquatic ecosystems, Water pollution standards, Fishes, Implementation, *Biological criteria, Water Quality Act.

PB93-143741/REB PC A03/MF A01
Environmental Protection Agency, Washington, DC.

Subjective-Probability-Based Scenarios for Uncertain Input Parameters: Stratospheric Ozone Depletion, December 1990.

RAND Corp., Santa Monica, CA.
J. K. Hammitt. Dec 90, 17p RAND/N-3140-1-EPA/JMO/RC

Pub. in Risk Analysis, v10 n1 p93-102 1990. See also N90-28157. Sponsored by Environmental Protection Agency, Washington, DC.

The paper presents and applies a method to choose sets of input conditions (scenarios) that efficiently represent knowledge about the joint probability distribution of inputs. A simple score function approximately relating inputs to a policy-relevant output--in this case, globally averaged stratospheric ozone depletion--is developed. The probability density function for the score-function value is analytically derived from a subjective joint probability density for the inputs. Scenarios are defined by selected quantiles of the score function. Using this method, scenarios can be systematically selected in terms of the approximate probability distribution function for the output of concern, and probability intervals for the joint effect of the inputs can be readily constructed.

Keywords: *Ozone depletion, *Stratosphere, *Computerized simulation, *Mathematical models, Risk assessment, Probability theory, Probability density functions, Monte Carlo method, Regulations, Emission, Reprints.

PB93-143972/REB PC A09/MF A02
Regulatory Impact Analysis for the National Emissions Standards for Hazardous Air Pollutants for Source Categories: Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Seven Other Processes.

Draft rept.
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. Dec 92, 176p EPA/450/3-92/009
See also PB91-159624.

Under authority of the 1990 Clean Air Act Amendments, a regulation has been proposed to reduce hazardous air pollutant emissions from synthetic organic chemical manufacturing industry (SOCMI) facilities and facilities in seven non-SOCMI processes. This report summarizes the impacts of the regulation, as well as providing summaries of the proposed regulatory options and the rationale for choosing them. The benefits from this regulation are also summarized, and a chapter comparing the benefits and costs concludes the report.

Keywords: *Air pollution standards, *Organic compounds, *Pollution regulations, Air pollution sampling, Air quality, Chemical industry, Air pollution control, Clean Air Act, Cost analysis, Benefits, Legal aspects, State government, *National Emissions Standards for Hazardous Air Pollutants, *Regulatory impact analysis.

PB93-143980/REB PC A10/MF A03
OSWER Source Book. Volume 1. Training and Technology Transfer Resources, 1992-1993.

Environmental Protection Agency, Washington, DC. Office of Solid Waste and Emergency Response. Sep 92, 206p EPA/542/B-92/005A
See also Volume 2, PB93-144129 and PB92-102169.

Volumes I and II of The OSWER Source Book provide information on the many training courses, publications, videotapes, and information systems and software available to support EPA staff, State and local agencies, and others involved in managing the Nation's

hazardous and solid waste programs. The Office of Solid Waste and Emergency Response's (OSWER) Technology Innovation Office (TIO) has compiled listings of the most significant training and technology transfer resources available to assist individuals with the responsibility for accomplishing OSWER's mission. Volume I of The Source Book contains listings of OSWER and other office training courses, publications, videotapes, information systems and software, and support programs devoted to hazardous and solid waste issues.

Keywords: *Technology transfer, *Hazardous materials, *Waste management, *Superfund, *Training, *Bibliographies, Documents, Education, Information transfer, State government, Personnel management, Technical assistance, Information systems, Video tapes, Training programs, Data bases, *Office of Solid Waste and Emergency Response, Resource Conservation and Recovery Act, Comprehensive Environmental Response Compensation and Liability Act.

PB93-14398/REB PC A07/MF A02
National Air Quality and Emissions Trends Report, 1991. Annual rept.
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. T. Curran, R. Faoro, T. Fitz-Simons, W. Freas, and B. Nelson. Oct 92, 130p EPA/450/R-92/001
See also report for 1990, PB92-141555.

The report presents national and regional trends in air quality from 1982 through 1991 for particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone and lead. Air quality trends are also presented for 15 metropolitan areas. Both national and regional trends in each of these pollutants are examined. National air quality trends are also presented for both the National Air Monitoring Sites (NAMS) and other site categories. In addition to ambient air quality, trends are also presented for annual nationwide emissions. These emissions are estimated using the best available engineering calculations; the ambient levels presented are averages of direct measurements. International comparisons of air quality and emissions are also contained in this report. This report also includes a section, Air Quality Levels in Metropolitan Statistical Areas (MSAs). Its purpose is to provide interested members of the air pollution control community, the private sector and the general public with greatly simplified air pollution information. Air quality statistics are presented for each of the pollutants for all MSAs with data in 1991.

Keywords: *Air quality, *Air pollution standards, *Emission factors, Trends, Concentration(Composition), Study estimates, Statistical analysis, Carbon monoxide, Lead(Metal), Nitrogen dioxide, Ozone, Particulates, Sulfur dioxide, Metropolitan areas, Regional analysis, Tables(Data), Graphs(Charts), *Emission inventories, National Ambient Air Quality Standards, National Air Monitoring Sites(NAMS).

PB93-144004/REB PC E99/MF E99
PR Notice 86-1 through 86-5.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
1986, 38p-In 5v
Set includes PB93-144012 through PB93-144053.

No abstract available.

PB93-144012/REB PC A01/MF A01
PR Notice 86-1. Notice to Manufacturers, Formulators, Producers and Registrants of Pesticides.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Feb 86, 4p EPA/540/09-93/244
See also Part 2, PB93-144020.
Also available in set of 5 reports PC E99/MF E99, PB93-144004.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation. Under Section 408 of the Federal Food, Drug, and Cosmetic Act (FFDCA), fees may be charged to cover the cost of processing tolerance petitions. The purpose of this PR Notice is to announce new Agency procedures regard-

ing the submission of fees associated with tolerance petitions.

Keywords: *Pesticides, *Notification procedures, *Regulations, US EPA, Requirements, United States, Implementation, Law(Jurisprudence), Fees, Tolerances(Physiology), *Registration, Federal Insecticide Fungicide and Rodenticide Act, Federal Food Drug and Cosmetic Act.

PB93-144020/REB PC A01/MF A01
PR Notice 86-2. Notice to Manufacturers, Formulators, Producers and Registrants of Pesticides.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Mar 86, 5p EPA/540/09-93/243
See also Part 1, PB93-144012 and Part 3, PB93-144038.
Also available in set of 5 reports PC E99/MF E99, PB93-144004.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation. The purpose of this PR Notice is to draw attention to and summarize the requirements to maintain records imposed under section 8 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), sections 408 and 409 of the Federal Food, Drug, and Cosmetic Act (FFDCA), and regulations thereunder (40 C.F.R. 169.2 and 160.195).

Keywords: *Pesticides, *Regulations, *Notification procedures, Requirements, Records management, Law(Jurisprudence), United States, US EPA, National government, *Registration, Federal Insecticide Fungicide and Rodenticide Act, Federal Food Drug and Cosmetic Act.

PB93-144038/REB PC A01/MF A01
PR Notice 86-3. Notice to Producers, Registrants, and Formulators.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Mar 86, 4p EPA/540/09-93/242
See also Part 2, PB93-144020 and Part 4, PB93-144046.
Also available in set of 5 reports PC E99/MF E99, PB93-144004.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation. The Pesticide Data Submitters List is a compilation of names and addresses of registrants who have indicated that they wish to be notified and offered compensation for use of their data, and was developed to assist pesticide applicants in fulfilling their obligation as required by sections 3(c)(1)(D) and 3(c)(2)(D) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and Subpart E of 40 CFR Part 152.

Keywords: *Pesticides, *Notification procedures, *Regulations, Listings, Requirements, United States, Law(Jurisprudence), National government, *Registration, Federal Insecticide Fungicide and Rodenticide Act.

PB93-144046/REB PC A02/MF A01
PR Notice 86-4. Notice to Registrants of Pesticides, and Applicants for Pesticide Registration.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Apr 86, 6p EPA/540/09-93/241
See also Part 3, PB93-144038 and Part 5, PB93-144053.
Also available in set of 5 reports PC E99/MF E99, PB93-144004.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties

interested in detailed procedures of regulation. This notice announces a new Environmental Protection Agency (EPA) policy regarding incomplete applications for registration of pesticides under section 3 of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), 7 USC 136a et seq. This notice also specifies new requirements for submitting applications to the Agency in order to implement this policy.

Keywords: *Pesticides, *Notification procedures, *Regulations, US EPA, Requirements, United States, Implementation, Law(Jurisprudence), *Registration, Federal Insecticide Fungicide and Rodenticide Act.

PB93-144053/REB PC A03/MF A01
PR Notice 86-5. Notice to Producers, Formulators, Distributors and Registrants.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Jul 86, 19p EPA/540/09-93/240
See also Part 4, PB93-144046.
Also available in set of 5 reports PC E99/MF E99, PB93-144004.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation. The notice discusses data to be submitted to the Environmental Protection Agency (EPA) in a standard format. This Notice also provides additional guidance about, and illustrations of, the required formats.

Keywords: *Pesticides, *Notification procedures, *Regulations, Requirements, United States, US EPA, Law(Jurisprudence), Standardization, Guidance, *Registration, Formats, Federal Insecticide Fungicide and Rodenticide Act.

PB93-144061/REB PC A01/MF A01
PR Notice 87-2. Notice to Procedures, Registrants, and Formulators.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
12 May 87, 4p EPA/540/09-93/247

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation.

Keywords: *Notification procedures, *Pesticides, *Regulations, US EPA, United States, Requirements, Law(Jurisprudence), National government, *Registration, Federal Insecticide Fungicide and Rodenticide Act.

PB93-144079/REB PC A01/MF A01
PR Notice 87-3. Notice to Manufacturers, Formulators, Distributors and Registrants of Pesticide Products.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Mar 87, 5p EPA/540/09-93/248

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation. This notice announces a policy whereby registrants of pesticide products containing certain active ingredients may delete rotational crop restrictions imposed as a result of the issuance of Registration Standards. The notice lists the pesticides for which the statements may be deleted. Applications to amend registrations are not required to accomplish the revision.

Keywords: *Pesticides, *Notification procedures, *Regulations, Crop production, Standards, United States, Requirements, Law(Jurisprudence), National government, US EPA, *Registration, Federal Insecticide Fungicide and Rodenticide Act.

EPA PUBLICATIONS BIBLIOGRAPHY

PB93-144087/REB PC A03/MF A01
PR Notice 87-5. Notice to Manufacturers, Formulators and Registrants of Pesticides.
 Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
 May 87, 43p EPA/540/09-93/250

The document is one in the series of 'Pesticide Regulatory Notice', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation.

Keywords: *Pesticides, *Regulations, *United States, Labels, Requirements, Government policies, Instructions, Manufacturers, Registrants, Notices.

PB93-144095/REB PC A02/MF A01
PR Notice 87-6. Notice to Manufacturers, Formulators, Procedures, and Registrants of Pesticide Products.
 Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
 May 87, 8p EPA/540/09-93/251

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation. This notice announces certain policies designed to reduce the potential for adverse effects from the use of pesticide products containing toxic inert ingredients. The agency is encouraging the use of the least toxic inert ingredient available and requiring the development of data necessary to determine the conditions of safe use of products containing toxic inert ingredients. In support of these policies, the Agency has categorized inert ingredients according to toxicity.

Keywords: *Pesticides, *Regulations, *Notification procedures, Toxicology, United States, Requirements, Law(Jurisprudence), US EPA, National government, *Registration, Federal Insecticide Fungicide and Rodenticide Act.

PB93-144111/REB PC A11/MF A03
 Environmental Protection Agency, Washington, DC. Technology Innovation Office.
Synopsis of Federal Demonstrations of Innovative Site Remediation Technologies.
 Federal Remediation Technologies Roundtable.
 Aug 92, 233p EPA/542/B-92/003
 See also PB91-921284. Sponsored by Environmental Protection Agency, Washington, DC. Technology Innovation Office.

The collection of abstracts, compiled by the Federal Remediation Technology Roundtable, describes field demonstrations of innovative technologies to treat hazardous waste. This document updates and expands information presented in the first edition of the collection which was published in 1991. The collection is intended to be an information resource for hazardous waste site project managers for assessing the availability and viability of innovative technologies for treating contaminated ground water, soils, and sludge. This document represents a starting point in the review of technologies available for application to hazardous waste sites. This compendium should not be looked upon as a sole source for this information -- it does not represent all innovative technologies nor all technology demonstrations performed by these agencies. Only Federally sponsored studies and demonstrations that have tested innovative remedial technologies with site specific wastes under realistic conditions as a part of large pilot- or full-scale field demonstrations are included. Those studies included represent all that were provided to the Federal Remediation Technology Roundtable at the time of publication. Information collection efforts are ongoing.

Keywords: *Technology innovation, *Remedial action, *Hazardous materials, *Waste treatment, Land pollution control, Federal agencies, Waste management, Abstracts, Information transfer, Water pollution control, Biological treatment, Physical treatment, Heat treatment, Cost analysis, Ground water, Soil treatment, Sludge treatment, Reviews, Field tests, Performance evaluation, Extraction, *Innovative treatment

technologies, Cleanup operations, Chemical treatment, Soil washing.

PB93-144129/REB PC A11/MF A03
OSWER Source Book. Volume 2. Training and Technology Transfer Resources, 1992-1993.
 Environmental Protection Agency, Washington, DC. Office of Solid Waste and Emergency Response.
 Sep 92, 236p EPA/542/B-92/005B
 See also Volume 1, PB93-143980.

Volumes I and II of The OSWER Source Book provide information on the many training courses, publications, videotapes, and information systems and software available to support EPA staff, State and local agencies, and others involved in managing the Nation's hazardous and solid waste programs. The Office of Solid Waste and Emergency Response's (OSWER) Technology Innovation Office (TIO) has compiled listings of the most significant training and technology transfer resources available to assist individuals with the responsibility for accomplishing OSWER's mission. Volume II contains frequently requested OSW publications, including those that address municipal solid waste and recycling. This second volume of The Source Book is new for this edition, and provides much additional information compared to the earlier version.

Keywords: *Technology transfer, *Hazardous materials, *Waste management, *Superfund, *Training, *Bibliographies, Training devices, Training programs, Documents, Information transfer, Education, Data bases, Video tapes, Information systems, Municipal wastes, Waste recycling, Permits, State government, Personnel development, Technical assistance, *Office of Solid Waste and Emergency Response, Resource Conservation and Recovery Act, Comprehensive Environmental Response Compensation and Liability Act.

PB93-144137/REB PC A04/MF A01
 Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.
Evaluation of POHC and PIC Screening Methods.
 Southern Research Inst., Birmingham, AL.
 R. E. Adams, R. H. James, and D. S. Weinberg. Jan 93, 62p EPA/600/R-93/004
 Contract EPA-68-02-4442
 See also PB90-116930 and PB-293 795. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

The analysis of incinerator effluents often focuses on the analysis of one or a few compounds as principal organic hazardous constituents (POHCs) and on products of incomplete combustion (PICs) to provide coverage for other compounds. Recent studies have proposed a risk-driven, tiered-analysis protocol to characterize combustion effluents. The testing of screening protocols for the measurement of organic emissions from incinerators can be divided into three categories: volatile, semivolatile, and nonvolatile. This study has concentrated on the semivolatile and nonvolatile categories of organic emissions. Samples were obtained from incinerator tests or were prepared as laboratory spike samples. Method evaluations were based on two types of samples. These were laboratory spiked samples to provide coverage of compounds of interest and field samples from incinerator tests. Incinerator samples were extracted and analyzed by GRAV, TCO, HPLC/UV, and GC/MS techniques. The other group of samples consisted of three split MM-5 trains. These were extracted and analyzed by GRAV, TCO, HPLC/UV, GC/MS, and HPLC/MS techniques.

Keywords: *Combustion efficiency, *Air pollution detection, *Organic compounds, *Incineration, *Waste disposal, *Hazardous materials, Gas analysis, Performance evaluation, Toxic substances, Alternatives, Sample preparation, Gas chromatography, Chromatographic analysis, Mass spectroscopy, Gravimetric analysis, Extraction, Ultraviolet spectroscopy, Air pollution sampling, Total chromatographable organic determination, High performance liquid chromatography.

PB93-144145/REB PC A04/MF A01
 Environmental Protection Agency, Research Triangle Park, NC. Source Methods Research Branch.
Volatile Organic Sampling Train Soot Interference Report.
 Midwest Research Inst., Kansas City, MO.

G. Hinshaw, F. W. Wilshire, and L. D. Johnson. Jan 93, 73p EPA/600/R-92/208
 Contract EPA-68-02-4463
 Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Source Methods Research Branch.

The U.S. Environmental Protection Agency uses Method 0030, the Volatile Organic Sampling Train (VOST), as a tool in determining the destruction and removal efficiencies of industrial boilers co-firing hazardous waste. Recently, concerns have been expressed over possible measurement biases due to soot deposits within the VOST. A laboratory study was initiated to investigate the collection efficiency of the method under sooty conditions. Method collection efficiency was evaluated by comparing volatile organic compound (VOC) levels in a control VOST (free of soot contamination) to VOC levels recovered while using a soot-laden particulate filter in the VOST probe assembly. VOCs were evaluated over the range of boiling points covered by the VOST method.

Keywords: *Volatile organic compounds, *Waste disposal, *Air samplers, *Air pollution sampling, *Hazardous materials, *Soot, Performance evaluation, Comparison, Incinerators, Combustion efficiency, Design criteria, Chemical analysis, Concentration(Composition), Filters, Boilers, Furnaces, Air pollution detection, EPA method 0030.

PB93-144152/REB PC A12/MF A03
 Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.
Analysis of Acid Precipitation Samples Collected by State Agencies. Sampling Period: January-December 1990. Annual report.
 Global Geochemistry Corp., Canoga Park, CA.
 L. S. Shepard. Feb 92, 254p EPA/600/R-93/006
 Contract EPA-68-02-4454
 See also PB90-191784. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

The report presents analytical data from the 30 acid precipitation collection sites in the State-Operated Network. Samples are collected weekly in plastic bag liners and shipped in 500 mL polyethylene bottles to Global Geochemistry Corporation (the central laboratory for the network). This report contains maps showing the location of each site, plots of analytical data, tables of all field and analytical data, plots comparing field and laboratory pH and conductivity, and information on data quality. Samples are analyzed for pH, strong acid, conductivity, fluoride, chloride, nitrite, phosphate, bromide, nitrate, sulfate, ammonium, sodium, potassium, calcium, and magnesium. The central laboratory renders technical assistance to the collection sites on problems concerning pH and conductivity. Each of the 10 participating state agencies receives analytical reports for the samples analyzed the previous month. Analyte concentration data are put on tape for later inclusion in the Acid Deposition System (ADS) Data Base.

Keywords: *Acid rain, *Precipitation(Meteorology), *Air pollution sampling, *Site surveys, Graphs(Charts), State agencies, Tables(Data), Concentration(Composition), pH, Conductivity, Sodium, Ammonium, Sulfates, Nitrates, Field tests, Fluorides, Chlorides, Nitrites, Phosphates, Bromides, Potassium, Calcium, Magnesium, Experimental design.

PB93-144202/REB PC A05/MF A01
Technical Guidance Manual for Performing Waste Load Allocations. Book 3: Estuaries. Part 4: Critical Review of Coastal Embayment and Estuarine Waste Load Allocation Modeling.
 Environmental Research Lab., Athens, GA. Center for Exposure Assessment Modeling.
 R. B. Ambrose, P. L. Freedman, D. W. Dilks, and B. A. Monson. Aug 92, 77p EPA/623/R-92/005
 See also PB92-231752. Prepared in cooperation with LTI, Ann Arbor, MI.

The document is the third of a series of manuals providing information and guidance for the preparation of waste load allocations. This part summarizes several historical case studies, with critical review by noted experts. The reader should refer to the preceding parts for information on model processes, available models,

EPA PUBLICATIONS BIBLIOGRAPHY

and guidance to monitoring and calibration. The technical guidance is comprehensive and state-of-the-art. Case studies of applications serve as the best teacher of the proper and improper use of this technical guidance. In this part are one freshwater embayment study and three estuarine studies where models were used for waste load allocation.

Keywords: *Manuals, *Water pollution control, *Water quality standards, *Water flow, *Estuaries, *Waste water, *Mathematical models, Guidelines, Hydrodynamics, Marine biology, Coastal regions, Case studies, Phytoplankton, Water allocation(Policy), Great Lakes, Potomac Estuary, Saginaw Bay, Manasquan Estuary, Calcasieu River Estuary.

PB93-144210/REB PC A16/MF A03
Proceedings of the National Conference (3rd): Water Quality Standards for the 21st Century. Held in Las Vegas, Nevada on August 31-September 3, 1992.
Environmental Protection Agency, Washington, DC. Office of Science and Technology.
Dec 92, 362p EPA/823/R-92/009
See also PB92-231828.

Contents: Applying EPA's Risk-Based Approach and Commitment to Sound Science to WQC/WQS Priority Setting; Life After Toxics: What Direction Now; Biological Measures: Can and Should They be Implemented; CSOs/Wet Weather: Are Today's WQC Relevant; Whole Effluent Toxicity; Re-examining Independent Applicability; Human Health Risk Management: Who Should We Protect; Sediment Management Policy Decisions; Advocates Forum; Ecological Risk Assessment; Human Health Risk Assessment: Reviewing EPA Guidelines; WQS for Ephemeral and Effluent-Dependent Streams; Additional Comments—Ecological Risk Assessment Comments.

Keywords: *Meetings, *Water quality standards, *Water pollution standards, Waste water, Toxic substances, Aquatic biology, Biological effects, Water pollution effects, Water pollution control, Combined sewers, US EPA, Environmental policy, Ecology, Risk assessment, Overflows, Storm water runoff, Toxicity, Pollution regulations, Public health, *Water quality criteria, Independent applicability, Biological criteria.

PB93-144277/REB PC A07/MF A02
Effects of Livestock Wastes on Small Illinois Streams: Lower Kaskaskia River Basin and Upper Little Wabash River Basins, Summer 1991.
Illinois State Environmental Protection Agency, Springfield, Div. of Water Pollution Control.
R. L. Hite, C. A. Bickers, M. M. King, and D. W. Brockamp. Jul 92, 148p IEPA/WPC/92-114
Prepared in cooperation with Southern Monitoring, Marion, IL.

In early 1991, the Illinois Environmental Protection Agency (IEPA) initiated an investigation to evaluate livestock waste runoff in southern Illinois. The primary objectives of this survey were to document stream quality impairments caused by livestock waste runoff, and ultimately, the need for better waste management practices, waste management systems, and funding for such systems. Information provided by Soil Conservation Service (SCS) and IEPA Agricultural staff identified an area in Clinton and Bond Counties in the Kaskaskia River basin and several upper Little Wabash River basin tributaries in Effingham and Cumberland Counties as candidate project areas.

Keywords: *Water pollution effects, *Manures, *Animal wastes, *Water quality, *Waste management, *Livestock, Kaskaskia River Basin, Wabash River Basin, Illinois, Streams, Surface waters, Watersheds, Water pollution sampling, Water chemistry, Runoff, Aquatic animals, Habitats, Sediments, Southern Region(Illinois).

PB93-144350/REB PC A03/MF A01
Evaluation of Resistively Heated Fuel Injection Technology to Reduce Cold Start Emissions and Assist Starting/Driveaway of a Methanol-Fueled Vehicle. Technical rept.
Environmental Protection Agency, Ann Arbor, MI. Control Technology and Applications Branch.
G. K. Piotrowski, and R. M. Schaefer. Mar 92, 22p EPA/AA/CTAB-92/02

The report provides the results from a program to evaluate a set of heated fuel injectors on an M100-fueled vehicle in an attempt to lower cold start emissions of unburned fuel and carbon monoxide and to improve cold startability and driveability. This technology was evaluated at several different temperatures.

Keywords: *Motor vehicle engines, *Methanol fuels, *Exhaust emissions, *Fuel injection systems, Carbon monoxide, Temperature dependence, Engine tests, Automotive fuels, Temperature effects, Fuel injectors, Controllers.

PB93-144368/REB PC A02/MF A01
Pesticide Fact Sheet Number 20.2: Amitrole.
Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
Dec 92, 8p EPA/540/FS-93/239
See also PB87-108874 and PB87-187175.

The document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. The Fact Sheet is issued on Amitrole for issuance of each special review document.

Keywords: *Pesticides, *Toxic substances, Amines, Toxicology, Ecology, Regulations, Herbicides, Biochemistry, Risk assessment, Reviews, *Chemical Information Fact Sheet, Amitrole, Triazole/amino, Use patterns, Science findings, CAS 61-82-5, Federal Insecticide Fungicide and Rodenticide Act.

PB93-144376/REB PC A03/MF A01
Conversion of Methanol-Fueled 16-Valve, 4-Cylinder Engine to Operation on Gaseous 2H2/CO Fuel. Interim Report 4. Technical rept.
Environmental Protection Agency, Ann Arbor, MI. Technology Development Group.
R. M. Schaefer, F. J. Hamady, and J. C. Martin. Sep 92, 27p EPA/AA/TDG-92/06

The report describes progress to date on a project to convert a Nissan CA18DE engine previously modified for operation on M100 neat methanol to operation on dissociated methanol (2H2/CO) gaseous fuel. This engine was operated on both M100 and simulated dissociated methanol (67 percent hydrocarbon and 33 percent carbon monoxide) fuels. This report describes recent modifications made to the engine and fuel delivery system and summarizes the results from recent testing.

Keywords: *Gas engines, *Methanol fuels, *Natural gas, *Motor vehicle engines, *Exhaust emissions, Engine tests, Automotive fuels, Performance evaluation, Carbon monoxide, Fueling systems, Fuel injectors.

PB93-145589/REB PC A05/MF A01
Technologies and Options for UST Corrective Actions: Overview of Current Practice.
Environmental Protection Agency, Washington, DC. Office of Underground Storage Tanks.
Aug 92, 91p EPA/542/R-92/010
See also PB88-241856.

A number of ex-situ and in-situ technologies are currently being used across the U.S. to treat petroleum contaminated media and debris generated at leaking underground storage tank (UST) corrective action sites. The objectives of this study are: to examine the current level of use of corrective action treatment technologies at leaking underground storage tank sites; to summarize experience with these technologies as documented in the literature in terms of treatment efficiency, relationship of performance to key operating parameters, and costs; and to summarize current state requirements that may affect the selection of technologies.

Keywords: *Technology innovation, *Underground storage, *Storage tanks, *Petroleum products, *Remedial action, *Land pollution control, Alternatives, Technology utilization, Leakage, Environment management, in-situ processing, Crude oil, Earth fills, Soil treatment, Heat treatment, Sites, Water pollution control, Strippers, Ex-situ processing, Cleanup operations, Soil washing.

PB93-145597/REB PC A04/MF A01
Restoration Potential of Diked Estuarine Wetlands in Washington and Oregon. Phase 2: Identification of Candidate Sites in Puget Sound.
Environmental Protection Agency, Seattle, WA. Region X.
Jul 90, 67p EPA/910/9-92/033
See also PB89-136097.

Under the auspices of the Clean Water Act, Section 404, one of the missions of the U.S. Environmental Protection Agency (EPA) is to enhance and protect wetland resources. In EPA Region 10, specifically in the Puget Sound area, there is opportunity to enhance aquatic resources by restoring some of the thousands of acres of wetlands that have been historically diked. The objectives of Work Assignment 24 is to field identify and prioritize areas in Puget Sound and the Straits of Juan de Fuca that were tidally influenced wetlands which are now either not functioning as wetlands or are providing limited wetland functions due to dike construction. This report is the field confirmation of the non-field data compiled in Phase I. The objective of the Phase I study was to identify areas in Washington and Oregon that: (1) once were estuarine wetlands but are not currently functioning as such due to dike construction; (2) were greater than five acres in size; and (3) may be suitable for restoration.

Keywords: *Estuaries, *Remedial action, *Wetlands, *Site surveys, *Water pollution control, Puget Sound, Oregon, Washington(State), Clean Water Act, Field tests, Feasibility studies, Environmental protection, Dikes, Water quality management, Reconnaissance, Criteria, EPA region 10.

PB93-145605/REB PC A04/MF A01
Model Pollution Prevention Plan for the Kraft Segment of the Pulp and Paper Industry.
Science Applications International Corp., Olympia, WA.
Sep 92, 75p EPA/910/9-92/030
Contract EPA-68-C8-0062
Prepared in cooperation with Amendola Engineering, Inc., Lakewood, OH. Sponsored by Environmental Protection Agency, Seattle, WA. Region X.

The document provides a generic process-by-process assessment of pollution prevention opportunities for the Kraft segment of the pulp and paper industry. The process areas covered are: wood yard operations, pulping and chemical recovery, pulp bleaching, pulp drying and papermaking, and wastewater treatment. These process areas are further broken down by specific process (e.g., oxygen delignification as one specific process under the pulping and chemical recovery area). For each specific process there is a description, a cost estimate, a discussion of applicability, and estimate of environmental benefits, and a list of references.

Keywords: *Pollution abatement, *Paper industry, *Kraft paper, *Sulfate pulping, *Environmental protection, Bleaching, Paper mills, Papermaking, Waste management, Industrial wastes, Cost analysis, Water pollution abatement, Air pollution abatement, Waste water, Chemical compounds, Storm water, Wood wastes, EPA region 10.

PB93-145613/REB PC A04/MF A01
Pollution Prevention for the Kraft Pulp and Paper Industry.
Science Applications International Corp., Olympia, WA.
Sep 92, 52p EPA/910/9-92/031
Contract EPA-68-C8-0062
Sponsored by Environmental Protection Agency, Seattle, WA. Region X.

The document is an annotated bibliography of publications related to pollution prevention in the Kraft segment of the pulp and paper industry. It is organized by process area as follows: chip preparation, chemical pulping, pulp washing, bleaching, chemical recovery, recausticizing, power generation, wastewater treatment, papermaking, and general plant. The document contains 269 citations.

EPA PUBLICATIONS BIBLIOGRAPHY

Keywords: *Pollution abatement, *Paper industry, *Kraft paper, *Sulfate pulping, *Environmental protection, *Bibliographies, Papermaking, Paper mills, Air pollution abatement, Electric power generation, Materials recovery, Wood chips, Washing, Water pollution abatement, Waste management, Chemical compounds, Recausticizing, EPA region 10.

PB93-145621/REB PC A02/MF A01
Babcock and Wilcox Cyclone Furnace Vitrification. Technology Demonstration Summary.
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Sep 92, 8p EPA/540/SR-92/017
See also PB92-222215, PB92-222223, and PB93-122315.

A Superfund Innovative Technology Evaluation (SITE) Demonstration of the Babcock and Wilcox Cyclone Furnace Vitrification Technology was conducted in November 1991. This Demonstration occurred at the Babcock and Wilcox (B and W) Alliance Research Center (ARC) in Alliance, OH. The B and W cyclone furnace may be used for thermal treatment of soils contaminated with organics, metals, and radionuclides. The cyclone furnace is designed to destroy organic contaminants and to immobilize metals and radionuclides in a vitrified soil matrix (slag).

Keywords: *Technology innovation, *Soil treatment, *Hazardous materials, *Vitrification, *Radioactive materials, Soil contamination, Performance evaluation, Organic compounds, Metals, Radioisotopes, Immobilization, Slags, Economic analysis, *Superfund Innovative Technology Evaluation Program, *B and W cyclone furnace, Babcock and Wilcox Alliance Research Center.

PB93-145639/REB PC A02/MF A01
Horsehead Resource Development Company, Inc., Flame Reactor Technology. Technology Demonstration Summary.
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Oct 92, 8p EPA/540/S5-91/005
See also PB92-213214.

Under the Superfund Innovative Technology Evaluation (SITE) program, the Horsehead Resource Development Company, Inc., (HRD) Flame Reactor was evaluated during a series of test runs. The tests were conducted at the HRD facility in Monaca, PA, using 72 tons of secondary lead smelter soda slag (waste feed) from the National Smelting and Refining Company, Inc., site in Atlanta, GA. The waste feed contained lead, zinc, iron, and many other metals and inorganic compounds. This summary includes an overview of the demonstration, a technology description, analytical results, and conclusions.

Keywords: *Waste treatment, *Technology innovation, *Slags, *Hazardous materials, Heat treatment, Performance evaluation, Metals, Inorganic compounds, Design criteria, Mass balance, Cost analysis, Air pollution sampling, Quality assurance, *Superfund Innovative Technology Evaluation Program, *HRD flame reactor, Horsehead Resource Development Company.

PB93-145654/REB PC A05/MF A01
Clean Water Act (Section 319): An Evaluation of Program Implementation in Region 10.
Environmental Protection Agency, Seattle, WA. Region X.
E. Barfield. Sep 92, 77p EPA/910/9-92/028
See also DE92016882.

Nonpoint source pollution, long overlooked in federal water pollution regulation, has now become a centerpiece of pollution control efforts. Congress added Section 319 – the nonpoint source management programs section – to the Clean Water Act in the 1987 Amendments to demonstrate federal commitment to nonpoint source control activities. Section 319(h) grant money, provided by EPA to individual states, forms an integral part of the federal nonpoint source program. EPA national and regional guidance give direction to the Section 319(h) grant program. As an evolving federal program Section 319 must carve out a niche for itself in relation to ongoing statewide nonpoint source control efforts. This paper provides an analysis of the Section 319 program and the effectiveness of Section 319(h)-funded projects in protecting water quality in Region 10 states, which include Washington, Oregon, Idaho,

and Alaska. The report identifies characteristics of successful Section 319 projects, reviews selected Section 319 projects, highlights several important issues surrounding the Section 319 program, and makes recommendations for program improvement.

Keywords: *Clean Water Act, *Water pollution abatement, *Nonpoint sources, Water pollution control, State government, State implementation plans, Water quality management, National government, Environmental policy, *EPA region 10.

PB93-145662/REB PC A04/MF A01
Environmental Protection Agency, Seattle, WA. Region X.
Guidelines for Developing Risk-Based Cleanup Levels at RCRA Sites in Region 10. Interim Final rept.
PRC Environmental Management, Inc., Seattle, WA. S. M. Tumblo, S. G. Stubecki, and A. J. DeAngelis.
31 Mar 92, 57p EPA/910/9-92/019
Contract EPA-69-W9-0009
Sponsored by Environmental Protection Agency, Seattle, WA. Region X.

The guidance document provides procedures for developing human and ecological health-based cleanup levels for contaminated sites undergoing corrective action and clean closure under the Resource Conservation and Recovery Act (RCRA). The procedures are presented in a step-by-step approach intended for use by U.S. Environmental Protection Agency (EPA) permit writers and regulatory compliance officials. The analysis presented here will enable RCRA site managers to identify sites for which federal or state promulgated action levels may be used as cleanup criteria, versus sites requiring exposure-based risk calculations to address site-specific problems. This document also describes situations that are likely to require expert technical assistance. Application of these procedures is intended for RCRA sites where hazardous waste or hazardous constituents have been released and where contaminated environmental media (that is, soil, surface water, sediment, groundwater, or air) and contaminant concentrations have been identified by means of environmental sampling and analysis.

Keywords: *Remedial action, *Hazardous materials, *Risk assessment, *Public health, *Ecology, *Waste management, Guidelines, Procedures, Environmental health, Permits, Pollution regulations, Criteria, Exposure, Environmental monitoring, Path of pollutants, US EPA, Standards, *Cleanup operations, *EPA region 10, Resource Conservation and Recovery Act.

PB93-145670/REB PC A05/MF A01
Environmental Protection Agency, Seattle, WA. Region X.
Pollution Prevention Opportunity Assessment and Implementation Plan. For Simpson Tacoma Kraft Company, Tacoma, Washington.
Science Applications International Corp., Olympia, WA.
Aug 92, 88p EPA/910/9-92/027
Contract EPA-68-C8-0062
Prepared in cooperation with Amendola Engineering, Inc., Lakewood, OH. Sponsored by Environmental Protection Agency, Seattle, WA. Region X.

The Environmental Protection Agency (EPA) in cooperation with the Simpson Tacoma Kraft Mill (Simpson) and the Washington State Department of Ecology (Ecology) conducted a study of the opportunities for pollution prevention at Simpson's Tacoma Mill. Feasible process alternatives were identified and evaluated for implementation by reviewing major process areas and equipment at the Mill using on-site observations, interviewing plant personnel, and evaluating emission and discharge estimates for the Toxics Release Inventory (TRI) data. Several recommendations were put forward for Simpson to develop and implement an on-going pollution prevention program and for specific process modifications to attain pollution prevention benefits. Based upon these recommendations, Simpson developed an implementation plan which contains a commitment to make short-term and long-term process modifications. EPA will use this plan for the pulp and paper industry. Ecology and Simpson will use the plan as a partial fulfillment of the State's requirement for a pollution prevention plan under Ecology's hazardous waste law. This is a good example of a public/private cooperative venture that has benefits to a company, the government and the environment.

Keywords: *Pollution abatement, *Paper mills, *Paper industry, *Hazardous materials, *Environment management, State implementation plans, Alternatives, Revisions, US EPA, Sulfate pulping, Waste management, Air pollution abatement, Water pollution abatement, Materials recovery, Equipment, Simpson Tacoma Kraft Company, Waste minimization, Pollution Prevention Act of 1990, Tacoma (Washington), EPA region 10, Source reduction.

PB93-145688/REB PC A03/MF A01
Manual for the Certification of Laboratories Analyzing Drinking Water. Criteria and Procedures Quality Assurance (Third Edition).
Environmental Protection Agency, Washington, DC. Office of Drinking Water.
Sep 92, 22p EPA/814/B-92/002
See also PB92-150390 and PB90-220500.

Contents: Introduction; Responsibilities; Implementation—(Regional Laboratories and Programs; Principal State Laboratories; Local Laboratories; Other Considerations for Certification; Requirements for Maintaining Certification Status; Criteria and Procedures for Downgrading/Revoking Certification Status; Reciprocity; Training; Technical Services; and Alternate Analytical Techniques); Chemistry—(Personnel; Laboratory Facilities; Laboratory Equipment and Instrumentation; General Laboratory Practices; Analytical Methodology; Sample Collection, Handling, and Preservation; Quality Assurance; Records and Data Reporting; and Action Response to Laboratory); Microbiology—(Personnel; Laboratory Facilities; Laboratory Equipment and Instrumentation; General Laboratory Practices; Analytical Methodology; Sample Collection, Handling, and Preservation; Quality Assurance; Records and Data Reporting; and Action Response to Laboratory); Radiochemistry—(Personnel; Laboratory Facilities; Laboratory Equipment and Instrumentation; General Laboratory Practices; Analytical Methodology; Sample Collection, Handling, and Preservation; Quality Assurance; Records and Data Reporting; and Action Response to Laboratory); Appendices.

Keywords: *Potable water, *Water analysis, *Manuals, *Water pollution detection, *Laboratories, Quality assurance, Chemical analysis, Certification, Performance testing, Criteria, Implementation, Requirements, Microbiology, Radiochemistry.

PB93-145704/REB PC A03/MF A01
Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.
Technical Guidance Manual for Performing Waste Load Allocations. Book 3: Estuaries. Part 3. Use of Mixing Zone Models in Estuarine Waste Load Allocations.
Cornell Univ., Ithaca, NY. DeFrees Hydraulics Lab. R. B. Ambrose, J. L. Martin, and G. H. Jirka. Aug 92, 49p EPA/823/R-92/004
See also PB92-231745. Sponsored by Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.

The document is the third of a series of manuals providing information and guidance for the preparation of waste load allocations. This document provides technical information and guidance for the preparation of waste load allocations in estuaries. The document is divided into four parts. This part describes the initial mixing of wastewater in estuarine and coastal environments and mixing zone requirements. The important physical processes that govern the hydrodynamic mixing of aqueous discharges are detailed, followed by application of available models to four case study situations.

Keywords: *Manuals, *Water flow, *Water pollution control, *Water quality standards, *Waste water, *Estuaries, *Mathematical models, Toxic substances, Guidelines, Water allocation (Policy), Environmental transport, Case studies, Coastal regions, Computerized simulation, Hydrodynamics, Ocean circulation, Clean Water Act, Industrial wastes, Expert systems, Mixing, Thermal effluents, Hydrology, *Mixing zones.

EPA PUBLICATIONS BIBLIOGRAPHY

PB93-145712/REB PC A06/MF A02
Proceedings of the Midwest Pollution Control Biologists Meeting, 1991. Environmental Indicators: Measurement and Assessment Endpoints. Held in Lincolnwood, Illinois on March 19-22, 1991. Final rept.
 Environmental Protection Agency, Chicago, IL. Region V.
 T. P. Simon, and W. S. Davis. Mar 92, 121p EPA/905/R-92/003

The report consists of 10 papers representing a portion of the 1991 presentations delivered at the Midwest Pollution Control Biologists Meeting, Lincolnwood, Illinois, March 19-22, 1991. Papers include technical research findings concerning biocriteria, non-point sources, comparisons of methods, and behavioral toxicity observations.

Keywords: *Environmental monitoring, *Water pollution control, *Meetings, *Biological indicators, Water pollution effects(Animals), Water pollution effects(Plants), Pollution monitoring, Electromagnetic fields, Freshwater fishes, Sediments, Algae, Annelida, Insects, pH, Growth, Plankton.

PB93-146082/REB PC A07/MF A02
Corvallis Environmental Research Lab., OR. Global Ecosystems Database. Version 1.0 (on CD-ROM). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. User's Guide. Volume 1. NGDC Key to Geophysical Records Documentation No. 26.
 National Geophysical Data Center, Boulder, CO.
 J. J. Kineman. Jun 92, 138p EPA/600/R-92/194A
 See also PB93-146090 and PB92-122803. Sponsored by Corvallis Environmental Research Lab., OR.

The user's guide gives a complete description of the overall project, including management, research, development, and review procedures that support the integration and improvement of this database, details of the database structure, organization of the CD-ROM, information on use with geographic information systems, as well as information on links between the database and global change characterization and modeling.

Keywords: *Ecosystems, *Data bases, Vegetative index, Climatic changes, Atmospheric temperature, Precipitation(Meteorology), Land use, Wetlands, Methane, Ecology, Albedo, Soils.

PB93-146090/REB PC A11/MF A03
Corvallis Environmental Research Lab., OR. Global Ecosystems Database. Version 1.0 (on CD-ROM). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Documentation Manual, DISC-A. Volume 1. NGDC Key to Geophysical Records Documentation No. 27.
 National Geophysical Data Center, Boulder, CO.
 J. J. Kineman, and M. A. Ohrenschild. Jun 92, 247p EPA/600/R-92/194B
 See also PB93-146082. Sponsored by Corvallis Environmental Research Lab., OR.

The Documentation Manual contains descriptive information about each data-set and exact file descriptions for each element in the data-set. The data-set descriptions are structured according to a precise template that is described in detail below (DOCUMENTATION TEMPLATE DEFINITIONS). The Data-Set Description provides an in-depth identification and tracking of the data-set and its technical properties, and gives key references for the data-set. At the end of this description is a summary of any Data Integration and Quality work associated with the project. Such work may range from simple format conversion to complicated re-structuring, interpolation, and testing. A User's Guide is provided as a separate document. In addition to their printed versions, the User's Guide and Documentation Manuals are provided in computer-readable form (bit-mapped image format) on the CD-ROMs. Reprints of the Primary References, including published journal articles, if applicable, are provided separately from the Documentation Manual as scanned image files on the CD-ROM. Reprints are assembled from available reports and publications, with permission from the authors and publishers. Only materials that are directly relevant to documenting the data-sets are reproduced.

Keywords: *Ecosystems, *Data bases, Vegetative index, Climatic changes, Atmospheric temperature,

Precipitation(Meteorology), Land use, Wetlands, Methane, Ecology, Albedo, Soils.

PB93-146108/REB PC A02/MF A01
PR Notice 87-7. Notice to Producers, Formulators and Registrants of Pesticides.
 Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.
 Jun 87, 8p EPA/540/09-93/252

This document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation.

Keywords: *Regulations, *Pesticides, *Notification procedures, Environmental policy, Law enforcement, Requirements, Law(Jurisprudence), Toxic substances, Revisions, US EPA, Violations, *Pesticide transfer, Registration, Federal Insecticide Fungicide and Rodenticide Act.

PB93-146348/REB PC A03/MF A01
Environmental Protection Agency, Washington, DC. Review of EPA's Environmental Monitoring and Assessment Program (EMAP). Interim Report.
 National Research Council, Washington, DC. Water Science and Technology Board.
 Jun 92, 36p
 Contract EPA-68-CO-0082/C
 See also PB91-191320 and PB92-103449. Sponsored by Environmental Protection Agency, Washington, DC.

Review of EPA's Environmental Monitoring and Assessment Program (EMAP) is an interim report on the committee's review of EPA's Environmental Monitoring and Assessment Program (EMAP). The committee endorses EPA's recognition that long-term ecological monitoring and research are essential and that EPA's statutory responsibilities are not limited to human health. The report concluded that probability-based sampling on a grid is an appropriate method of delineating the extent and providing a periodically updated survey of the nation's ecological resources. The committee also addresses questions concerning the ability of EMAP to achieve its other major goals, i.e., the assessment of status, the detection and characterization of changes or trends in the status of the ecological resources of the country, and the establishment of association between ecological condition and human-induced stresses. Because of the many concerns and substantive questions about the design and implementation of EMAP, the committee recommends that the program not be fully implemented until further evaluations are completed.

Keywords: *Environmental monitoring, *Environmental impact assessments, *Ecosystems, Environmental quality, US EPA, Reviews, Man environment interactions, Implementation, Trends, Environmental effects, Sampling, Data processing, Interagency cooperation, National government, Budgeting, *Environmental Monitoring and Assessment Program.

PB93-146462/REB PC A24/MF A04
Motor Vehicle-Related Air Toxics Study. Draft rept.
 Environmental Protection Agency, Ann Arbor, MI. Technical Support Staff.
 P. Brodowicz, P. Carey, R. Cook, and J. Somers. Dec 92, 564p
 Supersedes PB88-115001.

The report has been prepared in response to Section 202 (1) of the Clean Air Act. Specific pollutants or pollutant categories which are discussed in the report include benzene, formaldehyde, 1,3-butadiene, acetaldehyde, diesel and gasoline particulate matter, and gasoline vapors as well as selected metals and motor vehicle-related pollutants identified in Section 112 of the Clean Air Act. The focus of the report is carcinogenic risk from the pollutants. The study in the report attempts to summarize what is known about motor vehicle-related air toxics and to present all significant scientific opinion on each issue.

Keywords: *Risk assessment, *Carcinogens, *Automotive fuels, *Public health, Malignant neoplasms, Automobiles, Air pollution, Exhaust emissions, Environmental exposure, Particulates, Combustion products, Toxicology, Atmospheric chemistry,

Tables(Data), *Air pollution effects(Human), Clean Air Act, Integrated Air Cancer Project.

PB93-146793/REB PC A09/MF A02
Corvallis Environmental Research Lab., OR. Office of Research and Development. Process for Regional Assessment of Wetland Risk. Summary rept.
 ManTech Environmental Technology, Inc., Corvallis, OR.
 P. R. Adams, and S. Leibowitz. Oct 92, 180p EPA/600/R-92/249
 Contract EPA-68-C8-0006
 Sponsored by Corvallis Environmental Research Lab., OR. Office of Research and Development.

The primary purpose of the report is to demonstrate a process for prioritizing risks of wetland loss. It is intended for use in regions where technical data are very limited, or where the time or resources for obtaining such data are very limited. Because of the unevenness of the technical understanding of wetland functions in many regions, there are often instances where required, routine decisions by agency staff must rely on 'Best Professional Judgement' (BPJ). The report illustrates one means of formalizing BPJ in the context of risk assessment, using a process that incorporates available literature and information from a panel of regional experts. The process is demonstrated through an assessment of the risks to valued functions (e.g., wildlife production) as a result of wetland loss (through both conversion and degradation) in the Prairie Pothole Region of the United States (PPR). The process described in the report is intended to support ecological risk assessment, in the sense that it facilitates a priori determinations of probability that wetland functional losses will occur if certain actions are taken.

Keywords: *Wetlands, *Risk assessment, *Ecology, *Water pollution effects, Natural resources management, Regional analysis, Information transfer, Wildlife, Hydrology, Chemical compounds, Bioindicators, *Best Professional Judgement, Prairie Pothole Region(United States).

PB93-146827/REB PC A03/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab. Methods for Analyzing Extreme Events Under Climate Change. Final rept.
 National Center for Atmospheric Research, Boulder, CO. Environmental and Societal Impacts Group.
 R. W. Katz, and B. G. Brown. Jan 93, 41p EPA/600/R-93/014
 Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

The report summarizes work completed through a cooperative agreement between the National Center for Atmospheric Research (NCAR) and the Environmental Protection Agency (EPA) to study methods for analyzing extreme climate events. The overall goal of this project is to develop statistical models for extreme climate events that will be useful for the construction and application of scenarios of future climate. The results of this study will provide methods for determining how the likelihood of extreme climate events may change as other more general climate parameters (e.g., the mean or variance) change.

Keywords: *Climatic changes, *Statistical analysis, *Mathematical models, Climatology, Weather forecasting, Atmospheric temperature, Regional analysis, Spatial distribution, Global warming, Precipitation(Meteorology), Heat islands, Scenarios, Time series analysis, Cooperative agreements.

PB93-146835/REB PC A01/MF A01
Basic Concepts of Contaminant Sorption. Summary paper.
 Robert S. Kerr Environmental Research Lab., Ada, OK.
 Jan 93, 4p EPA/540/S-92/016
 See also PB91-191007.

The Robert S. Kerr Environmental Research Laboratory (RSKERL) has developed a number of issue papers and briefing documents which are designed to exchange up-to-date information related to the remediation of contaminated soil and ground water at hazard-

EPA PUBLICATIONS BIBLIOGRAPHY

ous waste sites. In an attempt to make the content of these documents available to a wider audience, RSKERL is developing a series of summary papers which are condensed versions of the original documents. Understanding the processes which dictate transport and fate characteristics of contaminants in soil and ground water is of paramount importance in designing and implementing remediation systems at hazardous waste sites. Sorption is often the most significant of these processes. The summary paper addresses the basic concepts of sorption in soil and ground water with an emphasis on organic contaminants having the characteristics of those often found at existing hazardous waste sites.

Keywords: *Sorption, *Land pollution, *Water pollution, Environmental transport, Organic compounds, Water chemistry, Soil chemistry, Waste disposal, Remedial action, Sites, Path of pollutants, Subsurface investigations, Desorption, Adsorption.

PB93-146843/REB PC A04/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Pollution Prevention Opportunity Assessment: USDA Beltsville Agricultural Research Center.
Science Applications International Corp., Cincinnati, OH.

S. P. Sobol. Feb 93, 56p EPA/600/R-93/008
Contract EPA-68-C8-0062
Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

A pollution prevention opportunity assessment (PPOA) was performed during the spring of 1991 which identified areas for waste reduction at the U.S. Department of Agriculture's Beltsville Agricultural Research Center (BARC), Beltsville, Maryland. The areas selected for this joint EPA/USDA study included general hazardous materials handling and usage, total Kjeldahl nitrogen (TKN) analyses, and high performance liquid chromatography (HPLC) analyses. One pollution prevention option applicable to total Kjeldahl analyses involved use of an automated nitrogen analyzer. Acid and base wastes are virtually eliminated and costs for chemicals and labor are reduced significantly. Other pollution prevention options for total Kjeldahl include phenate auto analyzer, micro analysis, and alternate catalyst. Pollution prevention options for HPLC included solid phase extraction, supercritical fluid extraction, solvent recovery, and column/particle size reduction. The approach used to conduct this PPOA is present in EPA's 'Waste Minimization Opportunity Assessment Manual' (EPA/625/7-88/003).

Keywords: *Pollution abatement, *Hazardous materials, *Waste management, US EPA, US DOA, Laboratories, Chemical analysis, Alternatives, Kjeldahl method, Nitrogen, Cost analysis, Chemical compounds, Chromatographic analysis, *Beltsville Agricultural Research Center, *Waste minimization, Source reduction, Beltsville(Maryland), High performance liquid chromatography.

PB93-146850/REB PC A01/MF A01
In-situ Bioremediation of Ground Water. Summary paper.
Robert S. Kerr Environmental Research Lab., Ada, OK.
Jan 93, 4p EPA/540/S-92/017

The Robert S. Kerr Environmental Research Laboratory (RSKERL) has developed a number of Issue Papers and Briefing Documents which are designed to exchange up-to-date information related to the remediation of contaminated soil and ground water at hazardous waste sites. In an attempt to make the content of these documents available to a wider audience, RSKERL is developing a series of Summary Papers which are condensed versions of the original documents. There are a number of techniques that may potentially be used for dealing with problems resulting from the contamination of ground water with organic compounds. Ground water can sometimes be treated in place using chemical or biological processes. An emerging technology for the in-situ remediation of ground water is the use of microorganisms to degrade contaminants which are present in aquifer materials. Although in-situ bioremediation has been used for a number of years in the restoration of ground water contaminated with petroleum hydrocarbons, its application to other classes of contaminants is relatively recent. This is discussed in the summary paper.

Keywords: *In-situ processing, *Ground water, *Remedial action, *Water pollution control, Organic compounds, Microorganisms, Biodeterioration, Hazardous materials, Waste disposal, Environmental transport, Performance evaluation, *Biological treatment.

PB93-146868/REB PC A03/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Pollution Prevention Opportunity Assessment: Manufacturing and Fabrication Repair Laboratory at Sandia National Laboratories.
Science Applications International Corp., Cincinnati, OH.
G. Wahl, and K. Whitford. Sep 92, 36p EPA/600/R-93/015A
Contract EPA-68-C8-0062
See also PB93-146900, PB92-213206, PB91-110015, and PB90-256439. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

These two reports summarize pollution prevention opportunity assessments conducted jointly by EPA and DOE at the Geochemistry Laboratory (PB93-146900) and the Manufacturing and Fabrication Repair Laboratory (MFRL) at the Department of Energy's Sandia National Laboratories (SNL) facility in Albuquerque, New Mexico, as part of EPA's Waste Reduction Evaluation at Federal Sites (WREAFS) Program. The assessments followed the general format of the Facility Pollution Prevention Guide (PB92-213206) and resulted in a number of pollution prevention options at both of the waste generating activities. While the two Laboratories selected generate only small volumes of waste, the significance of this project was in conducting a joint pollution prevention opportunity assessment with DOE and demonstrating the procedure with DOE's waste minimization network (Min Net). This report describes a Pollution Prevention Opportunity Assessment (PPOA) for the MFRL at SNL, Albuquerque, New Mexico. The WREAFS program, whose purpose is to identify and promote the use of pollution prevention techniques and technologies through technology transfer, provided an appropriate vehicle to accomplish these purposes.

Keywords: *Pollution abatement, *Environmental protection, *Waste management, *Hazardous materials, Sandia Laboratories, Federal agencies, Assessments, US EPA, US DOE, Laboratories, Manufacturing, Alternatives, Maintenance, Degreasing, Repair shops, Feasibility studies, Waste minimization, Source reduction, Albuquerque(New Mexico).

PB93-146900/REB PC A03/MF A01
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
Pollution Prevention Opportunity Assessment: Geochemistry Laboratory, Sandia National Laboratories.
Science Applications International Corp., Cincinnati, OH.
K. Whitford, and G. Wahl. Sep 92, 40p EPA/600/R-93/015B
Contract EPA-68-C8-0062
See also PB93-146868, PB92-213206, PB91-110015, and PB90-256439. Sponsored by Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.

These two reports summarize pollution prevention opportunity assessments conducted jointly by EPA and DOE at the Geochemistry Laboratory and the Manufacturing and Fabrication Repair Laboratory at the Department of Energy's Sandia National Laboratories (SNL) facility (PB93-146868) in Albuquerque, New Mexico, as part of EPA's Waste Reduction Evaluation at Federal Sites (WREAFS) Program. The assessments followed the general format of the Facility Pollution Prevention Guide (PB92-213206) and resulted in a number of pollution prevention options at both of the waste generating activities. While the two Laboratories selected generate only small volumes of waste, the significance of this project was in conducting a joint pollution prevention opportunity assessment with DOE and demonstrating the procedure with DOE's waste minimization network (Min Net). This report summarizes the Pollution Prevention Opportunity Assessment (PPOA) performed for SNL's Geochemistry Lab. The major focus of the assessment was identification of pollution prevention opportunities within research project design and implementation activities. Preliminary review of the lab's operations revealed these

larger issues as the best opportunities for pollution prevention.

Keywords: *Pollution abatement, *Environmental protection, *Waste management, *Hazardous materials, Sandia Laboratories, Laboratories, Geochemistry, Pollution regulations, US DOE, US EPA, Federal agencies, Implementation, Waste minimization, Source reduction, Albuquerque(New Mexico).

PB93-146918/REB PC A08/MF A02
Environmental Protection Agency, Washington, DC. Risk Assessment Forum.
Report of the Neurotoxicity Risk Assessment Guidelines Peer Review Workshop. Held in Washington, DC, on June 2-3, 1992. Final rept.
Eastern Research Group, Inc., Lexington, MA.
Sep 92, 153p EPA/630/R-92/003
Contract EPA-68-C1-0030
Sponsored by Environmental Protection Agency, Washington, DC. Risk Assessment Forum.

On June 2 and 3, the EPA sponsored a workshop to peer review draft neurotoxicity risk assessment guidelines. The meeting opened with discussion of key features of the draft guidelines, including areas of expected controversy, followed by workshop review of the scientific foundation for each element in the guidelines. Workshop participants from academia, industry, and government (state and federal) brought expertise in a wide range of relevant disciplines to the discussion. The workshop did not attempt to address all of the principles, concepts, and methods that are important for neurotoxicity risk assessment. Rather, EPA asked for expert opinion on the logic, scientific validity, and utility of the principles proposed in the workshop draft as general guidance for EPA risk assessors. The Agency is using the peer review comments to help complete a proposal for neurotoxicity risk assessment guidelines that will be published for public comment and reviewed by EPA's Science Advisory Board during the coming year.

Keywords: *Meetings, *Toxicology, *Nervous system, *Risk assessment, Guidelines, Peer review, Laboratory animals, Humans, US EPA, Behavior, Dose-response relationships, Health hazards, *Neurotoxicity.

PB93-146991/REB PC A03/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Advanced Insulations for Refrigerator/Freezers: The Potential for New Shell Design Incorporating Polymer Barrier Construction. Final rept. Aug 91-Nov 92.
Lawrence Berkeley Lab., CA. Energy and Environment Div.
B. Griffith, and D. Arasteh. Jan 93, 36p EPA/600/R-93/009
Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The report examines domestic refrigerator/freezer (R/F) design alternatives which may offer greater increase in thermal performance than is possible with panel/foam composites. (NOTE: Current efforts to design and build R/Fs with high performance insulation technology are directed at using vacuum panels in a composite with polymer foam to improve performance; however, certain restrictions generally enable only relatively small improvement in thermal resistance using these techniques.) These design alternatives involve basic redesign of the R/F and use of alternative materials of construction. One design alternative includes use of a polymer outer shell material component that incorporates in its construction an advanced insulation technology that reduces thermal bridging and edge losses. Computer modelling of a R/F door incorporating the concept shows a doubling of effective thermal resistance over conventional R/F designs. The report also addresses materials and manufacturing technologies needed to fabricate polymer-barrier advanced insulation components for R/Fs.

Keywords: *Insulation, *Environmental chemical substitutes, *Refrigerators, *Freezers, *Pollution abatement, *Polymers, Design criteria, Chlorohydrocarbons, Manufacturing, Thermal resistance, Performance evaluation, Alternatives, Foam, *Advanced insulation panels, *Advanced insulation components.

EPA PUBLICATIONS BIBLIOGRAPHY

PB93-147007/REB PC A07/MF A02
Enabling Document for Regulations Governing Compliance Extensions for Early Reductions of Hazardous Air Pollutants.
 Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. Dec 92, 137p EPA/450/3-91/013
 Supersedes PB92-180132.

The regulations governing compliance extensions for early reductions of hazardous air pollutants are promulgated under the authority of section (612)(i)(5) of the Clean Air Act (CAA). These rules would apply to sources that seek compliance extensions from standards promulgated under section (112)(d) of the CAA. The document provides practical information on the implementation of the Early Reductions Program.

Keywords: *Hazardous materials, *Air pollution standards, *United States, Regulations, Law enforcement, Reduction, Licenses, Emission factors, Pollution sources, Risk assessment, Compliance, Gases, Chemical compounds, Sites, *Early Reduction Program, Clean Air Act and Amendments of 1990, Industrial Toxics Project.

PB93-147015/REB PC A02/MF A01
PR Notice 87-8. Notice to Manufacturers, Formulators, Distributors, and Registrants of Pesticides.
 Environmental Protection Agency, Washington, DC. Office of Pesticide Programs. Jun 87, 6p EPA/540/09-93/253
 See also PB93-149151.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation.

Keywords: *Regulations, *US EPA, *Pesticides, Requirements, Labels, Procedures, Government policies, Aerosols, *Registration, Applicants.

PB93-149151/REB PC A01/MF A01
PR Notice 87-8. Notice to Pesticide Applicants, Registrants and Petitioners.
 Environmental Protection Agency, Washington, DC. Office of Pesticide Programs. Aug 87, 5p EPA/540/09-93/254
 See also PB93-149169.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation.

Keywords: *Regulations, *US EPA, *Pesticides, Requirements, Licenses, Procedures, Government policies, *Registration, Applicants, Petitions, Exemptions.

PB93-149169/REB PC A01/MF A01
PR Notice 87-10. Notice to Pesticide Applicants, Registrants and Petitioners.
 Environmental Protection Agency, Washington, DC. Office of Pesticide Programs. Oct 87, 4p EPA/540/09-93/255
 See also PB93-147015.

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation.

Keywords: *Regulations, *US EPA, *Pesticides, Requirements, Toxicology, Pathology, Recommendations, Storage, Reporting, *Registration, Applicants, Federal Insecticide, Fungicide, and Rodenticide Act.

PB93-149177/REB PC A03/MF A01
Aerosol Acidity Characterization of Large Metropolitan Areas: Pilot and Planning for Philadelphia.
 Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.

J. M. Waldman, P. Koutrakis, R. Burton, W. E. Wilson, and L. J. Purdue. 1993, 11p EPA/600/A-93/002
 Prepared in cooperation with Robert Wood Johnson Medical School, Piscataway, NJ., and Harvard School of Public Health, Boston, MA.

The report described the EPA's multi-year program to investigate the specific issues surrounding human exposures to aerosol activity. Philadelphia, a large metropolitan area in the heart of the northeastern seaboard afflicted with photochemical regional smog during the summertime, was chosen as the first city in the program. A pilot study of ambient concentrations was conducted in July 1991. An annular denuder system (ADS) sampler was operated for two weeks near downtown Philadelphia, with a second unit operated in central, suburban New Jersey, the same location of measurements in past years. The Philadelphia site was found to have higher concentrations of most major aerosol species, ammonia and acidic particles than in New Jersey, showing that aerosol neutralization within the urban center will not necessarily totally eliminate acidic particle exposures.

Keywords: *Air pollution, *Aerosols, Acidity, *Urban areas, Public health, Toxicology, Environmental monitoring, Atmospheric chemistry, Evaluation, Pennsylvania, Air pollution effects(Humans), *Pilot studies, *Philadelphia(Pennsylvania).

PB93-149185/REB PC A03/MF A01
Environmental Research Lab.-Duluth, MN. Vertical Diffusion in Small Stratified Lake: Data and Error Analysis. Journal article.
 Minnesota Univ.-Duluth. St. Anthony Falls Hydraulic Lab. M. Hondzo, C. R. Ellis, and H. G. Stefan. cOct 91, 18p EPA/600/A-93/003
 Grant EPA-R-816230-01-0
 Pub. in Jnl. of Hydraulic Engineering, v117 n10 p1353-1369 Oct 91. St. Anthony Falls Hydraulic Laboratory Technical Paper 318, Series A. Sponsored by Environmental Research Lab.-Duluth, MN.

Water temperature profiles were measured at 2-min intervals in a stratified temperate lake with a surface area of 0.06 sq km and a maximum depth of 10 m from May 7 to August 9, 1989. The data were used to calculate the vertical eddy diffusion coefficient $K_{sub z}$ in the hypolimnion. The depth was representative of a large number of lakes in the north central United States. $K_{sub z}$ was calculated over time intervals of 1 to 15 days and varied from 0.001 to 0.1 sq cm/s. A numerical model was developed for heat conduction in the sediments, and heat flux between water and sediments was incorporated into the relationship from which eddy diffusivity was estimated. Heat flux between water and lake sediments, a term commonly neglected, was found to be important in the $K_{sub x}$ estimation. $K_{sub z}$ values were related to stratification stability as measured by the Brunt-Vaisala frequency N using Welander's expression of the form $K_{sub z} = a(N(2-))^{b-+}$. The longest time interval (15 days) and the smallest depth increment (1 m) used in the study were found to give the best $K_{sub z}$ estimation. (Copy-right (c) 1991, ASCE.)

Keywords: *Ryan Lake, *Stratification, *Thermal conductivity, *Sediments, Limnology, Temperature gradients, Turbulent diffusion, Thermoclines, Eddies, Heat flux, Heat transfer, Error analysis, Charts, Mathematical models, Minnesota, Reprints, Hypolimnion.

PB93-149193/REB PC A03/MF A01
Bioremediation. Book chapter.
 Robert S. Kerr Environmental Research Lab., Ada, OK. J. M. Thomas, C. H. Ward, R. L. Raymond, J. T. Wilson, and R. C. Loehr. c1992, 19p EPA/600/A-93/004
 Pub. in Encyclopedia of Microbiology, Volume 1, A-C, 1992. Prepared in cooperation with National Center for Ground Water Research, Houston, TX., and Texas Univ. at Austin.

Bioremediation is defined in the article as the process by which microorganisms are stimulated to rapidly degrade hazardous organic contaminants to environmentally safe levels in soils, subsurface materials, water, sludges, and residues. Stimulation is achieved by the addition of nutrients and a terminal electron acceptor, usually oxygen, because most biological reactions occur faster under aerobic than anaerobic conditions. Under anaerobic conditions, nitrate has been used as the terminal electron acceptor. The microor-

ganisms use the contaminants as a food source and convert the contaminants into biomass and harmless by-products of metabolism such as CO₂ and inorganic salts. Usually bioremediation is used to degrade contaminants that are sorbed to surfaces or dissolved in water rather than to degrade pure chemical(s). As a result, the process is used in conjunction with other techniques in remediation of contaminated sites. The contaminants can be biodegraded in situ or removed and placed in a bioreactor, which can be placed off or at the site where the contamination occurred. (Copy-right (c) 1992 by Academic Press, Inc.)

Keywords: *Biological treatment, *Remedial action, *Pollution control, *Biodeterioration, *Hazardous materials, Microorganisms, Soil treatment, Land pollution control, Aquifers, Water pollution control, Waste treatment, Biochemistry, Composting, Subsurface investigations, Reprints.

PB93-149201/REB PC A03/MF A01
Comparison of Ground-Water Sampling Devices Based on Equilibration of Water Quality Indicator Parameters. Symposium paper.
 Robert S. Kerr Environmental Research Lab., Ada, OK. C. J. Paul, and R. W. Puls. Nov 92, 20p EPA/600/A-93/005
 Presented at the National Ground Water Sampling Symposium, Washington, DC., November 30, 1992. Prepared in cooperation with ManTech Environmental Technology, Inc., Ada, OK.

The sampling device selected when obtaining ground water samples can have a significant impact on the representativeness and reproducibility of the sample. The study evaluated several different sampling devices (low speed submersible pump, peristaltic pump, and bladder pump) in two monitoring wells to obtain ground-water samples based on the equilibration of water quality indicator parameters. The indicator parameters were continuously monitored during purging and sampling with all devices and include: turbidity, specific conductance, pH, oxidation-reduction potential, dissolved oxygen, and temperature. Contaminant (chromium and trichloroethylene) concentration levels were also measured for all devices.

Keywords: *Ground water, *Pumps, *Performance evaluation, Samplers, Submersible pumps, Water pollution sampling, Field tests, Hazardous materials, Charts, Comparison, North Carolina, Peristaltic pumps, Bladder pumps, Elizabeth City(North Carolina).

PB93-149219/REB PC A02/MF A01
U.S. EPA's QA/QC Program for Waste Management Facilities. Proceedings of the GRI Seminar (6th), MQC/MQA and CQC/CQA of Geosynthetics. Held in Philadelphia, Pennsylvania on December 10-11, 1992.
 Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. R. E. Landreth. 1992, 8p EPA/600/A-93/006
 See also PB87-132825 and PB93-105625.

The U.S. Environmental Protection Agency has a very strong interest in the design, construction, performance and closure of waste management facilities. In general, the Agency would like these facilities to be environmentally friendly - i.e., not to be a source of any type of potential pollution to the environment or a significant threat to public health. Since these facilities are man-made structures built with man-made and natural materials, it is incumbent to build the best facility that one can. The Agency, under the RCRA regulations as amended by HSWA and the Municipal Solid Waste Landfill regulations, strongly encourage the use of quality control/quality assurance (QA/QC) programs to help ensure that the construction of waste management facilities is the highest that can be achieved.

Keywords: *Waste management, *Quality assurance, *Quality control, *Buildings, *Construction management, US EPA, Pollution regulations, Performance standards, Compliance, Hazardous materials, Design criteria, Specifications, Reprints.

EPA PUBLICATIONS BIBLIOGRAPHY

PB93-149227/REB PC A03/MF A01
Potential for Joint Research between EPA and the U.S. Army. Symposium paper.
 Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
 D. Sullivan, J. Farlow, and F. Freestone. 1992, 26p
 EPA/600/A-93/007

See also PB90-182486, PB90-249772 and PB92-166859. Presented at the 1992 U.S. Army Annual R and D Symposium, Williamsburg, VA., June 1992.

The environmental problems being faced by the US Environmental Protection Agency (EPA) and the US Army are closely related, and the research needed to address them overlaps in many areas. The paper presents an overview of the hazardous waste site remediation research programs being conducted by EPA's Risk Reduction Engineering Laboratory (RREL) and proposes a number of areas where joint efforts between the two agencies could be mutually beneficial. EPA has established a policy of encouraging the use of innovative technologies that both reduce the quantity of contaminant to be handled and also destroy harmful contaminants. Several technologies, including soil washing, soil vapor extraction, thermal desorption, solvent extraction and soil flushing are of special interest. The RREL has established capabilities for treatability studies and other research endeavors at a number of its locations. EPA also continues to foster the use of innovative technologies through its Superfund Innovative Technology Evaluation (SITE) program. In addition, EPA has established a technology transfer program available to other agencies involving both manuals/documents and training personnel. The authors welcome future contacts by Army personnel interested in sharing environmental projects.

Keywords: *Hazardous materials, *Remedial action, *Research, *Waste management, *Technology transfer, US EPA, Army, Soil treatment, Land pollution control, Technology utilization, Federal agencies, Cooperative agreements, Cleanup operations, Innovative treatment technologies, Waste minimization.

PB93-149235/REB PC A02/MF A01
 Corvallis Environmental Research Lab., OR.
Development of Genetically Enhanced Baculovirus Pesticides (Chapter 5). Book chapter.
 Boyce Thompson Inst. for Plant Research, Ithaca, NY.
 H. A. Wood. 1991, 10p EPA/600/A-93/008
 Pub. in Biotechnology for Biological Control of Pests and Vectors, 1991. Sponsored by Corvallis Environmental Research Lab., OR.

The report describes the assessment of the potential environmental impacts of genetically improved viral pesticides, including an evaluation of the properties of the foreign gene product(s) and the biological properties of the altered virus itself. The current field release studies are collecting much of the information which will be needed to assess the environmental safety of these new pesticides. Of primary concern will be the cost-to-benefit ratios as determined by production costs, stability, application, technology, and field efficacy. Despite the improvements afforded through biotechnology, it is clear that viral and other microbial pesticides will only reduce, not eliminate, the agricultural requirements for synthetic pesticides. Even so, biological pesticides are among the best solutions to reducing crop losses in the absence of ecological disturbances and potential health hazards.

Keywords: *Pesticides, *Insecticides, Bacteriophages, Biotechnology, Hybridization, Field tests, Viruses, Genetic engineering, Public health, Environmental impacts, Agriculture, *Biological insect control, Risk assessment.

PB93-149243/REB PC A02/MF A01
 Corvallis Environmental Research Lab., OR.
Ecologically Acceptable Strategy for the Use of Genetically Engineered Baculovirus Pesticides. Book chapter.
 Boyce Thompson Inst. for Plant Research, Ithaca, NY.
 H. A. Wood, P. R. Hughes, N. van Beek, and M. Hamblin. 1990, 6p EPA/600/A-93/010
 Pub. in Insect Neurochemistry and Neurophysiology, 1989. Sponsored by Corvallis Environmental Research Lab., OR.

The basis for the first U.S. Environmental Protection Agency approval for the field release of a genetically-engineered virus has been to take advantage of the biological properties of baculovirus in such a way that an

engineered virus could possess enhanced pesticidal properties but, at the same time, would pose no environmental or health hazards. The ultimate goal of these investigations is to reduce the agricultural requirement for synthetic chemical pesticides through the development of viral pesticides with enhanced pesticidal properties.

Keywords: *Pesticides, *Bacteriophages, Field tests, Biotechnology, Environmental impacts, Hybridization, Genetic engineering, Insecticides, Viruses, Public health, Agriculture, *Biological pest control, Risk assessment.

PB93-149250/REB PC A03/MF A01
Uncertainties in Countrywide Forest Biomass Estimates. Symposium paper.

Corvallis Environmental Research Lab., OR.
 C. E. Peterson, and D. P. Turner. 1992, 13p EPA/600/A-93/011

See also PB89-213300. Presented at the IPCC AFOS-Workshop on Carbon Balance of World's Forested Ecosystems: Towards a Global Assessment, Joensuu, Finland, May 11-15, 1992. Prepared in cooperation with ManTech Environmental Technology, Inc., Corvallis, OR.

Country-wide estimates of forest biomass are the major driver for estimating and understanding carbon pools and flux, a critical component of global change research. Important determinants in making the estimates include the areal extent of forested lands and their associated biomass. Estimates for these parameters may be derived from surface-based data, photo interpretation or satellite remote sensing, with varying degrees of uncertainty. Ground data are typically aggregated by forest type, stand age, productivity level, and ownership. Survey priority is usually given to regions and forest types with timber of commercial value, such that information on understory biomass and forested lands of low commercial value is either absent or of limited reliability.

Keywords: *Biomass, *Forest land, *Carbon cycle, *Error analysis, Global aspects, Study estimates, Statistical analysis, Organic matter, Air land interactions, Air pollution, *Uncertainty.

PB93-149268/REB PC A04/MF A01
 Corvallis Environmental Research Lab., OR.
Role of Soil Organic Acids in Mineral Weathering Processes (Chapter 6). Book chapter.
 Wyoming Univ., Laramie.

J. I. Drever, and G. F. Vance. 1992, 51p EPA/600/A-93/012
 Pub. in Role of Organic Acids in Geologic Processes, 1992. Sponsored by Corvallis Environmental Research Lab., OR.

The paper summarizes the occurrence and distribution of soluble organic acids in soils and reviews the role of organic acids in mineral weathering. Organic acids, particularly humic and fulvic acids, are present in soil solutions and these acids have a major influence on the translocation of iron and aluminum in soil profiles. Organic acids may also accelerate the weathering of primary silicate minerals. The paper deals with the controversy as to whether or not organic acids at natural concentrations significantly accelerate the rate of dissolution of primary silicate minerals.

Keywords: *Soils, *Soil chemistry, *Weathering, *Organic acids, Humic acids, Soil profiles, Dissolving, Soil structure, Diagrams, Silicate minerals, Agriculture, Geochemistry, Chemical reactions, Fulvic acids, Soil solutions, Microenvironment, Soil-water-plant relationships.

PB93-149276/REB PC A04/MF A01
 Corvallis Environmental Research Lab., OR.
Isolation and Purification of Bacterial DNA from Soil. Book chapter.
 Michigan State Univ., East Lansing.
 W. E. Holben. 1992, 53p EPA/600/A-93/013
 Pub. in Methods of Soil Analysis, 1992. Sponsored by Corvallis Environmental Research Lab., OR.

Recently, new methods for monitoring specific bacterial populations in environmental samples have become available. These methods employ the techniques of molecular biology to distinguish, enumerate and monitor individual bacterial populations within a microbial community by the detection of DNA se-

quences specific to those populations using appropriate molecular probes. DNA-based detection of bacterial populations helps to overcome a major limitation of microbial ecology and soil microbiology; the difficult task of specifically monitoring an individual population of microbes in the environment, and in the presence of the entire microbial community. Such capabilities are essential to understanding the complex interactions between the environment, other microorganisms and the population(s) of interest.

Keywords: *Deoxyribonucleic acids, *Bacteria, *Soil microbiology, *Purification, Monitoring, Populations, Microbiology, Molecular structure, Detection, Environmental impacts, Recovery, Distillation, Separation, Humus, Ecology, Lysis method.

PB93-149334/REB PC A08/MF A02
Determination of Rates of Reaction in the Gas-Phase in the Troposphere. Theory and Practice. 5. Rate of Indirect Photoreaction.

Environmental Protection Agency, Washington, DC.
 Office of Pollution, Prevention, and Toxics.
 A. Leifer. Jan 93, 162p EPA/744/R-93/001
 See also Part 4, PB92-150382.

The document contains a critical review of the Atmospheric Oxidation Computer Program (AOP) for estimating the second-order rate constant $k(\text{sub OH})$ for the reaction of an organic chemical with hydroxyl radicals in the gas-phase in the troposphere. AOP is being used to regulate industrial chemicals under Sections 4 and 5 of the Toxic Substances Control Act. It describes the computerization of the structure/reactivity relationships of Atkinson of the University of California/Riverside by Syracuse Research Corporation. The only input needed to operate AOP is the SMILES notation, a computerized notation of the molecular structure of the chemical. The computer program will estimate $k(\text{sub OH})$ and the associated half-life for the reaction of organic chemicals in the atmosphere. AOP will also list an experimental value of $k(\text{sub OH})$ if it is available in the scientific literature.

Keywords: *Hydroxyl radicals, *Reaction kinetics, *Troposphere, *Organic compounds, *Atmospheric chemistry, *Air pollution, Atmospheric models, Chemical reactivity, Computerized simulation, Structure-activity relationships, Toxic Substances Control Act.

PB93-149383/REB PC A06/MF A02
Development of Index of Biotic Integrity Expectations for the Ecoregions of Indiana. I. Central Corn Belt Plain.

Environmental Protection Agency, Chicago, IL. Region V.
 Nov 91, 105p EPA/905/9-91/025
 See also PB89-138440, PB85-184349, PB92-203959 and PB93-143683.

The Clean Water Act Amendments of 1987 mandate the development of biological criteria for evaluating the nation's surface waters. The requirements of Section 304(a) was implemented in Indiana to determine water resource degradation. A total of 197 headwater and wading stream sites were sampled in the Central Corn Belt Plain ecoregion in order to develop and calibrate an Index of Biotic Integrity for use in Indiana. Based on inherent variance within the ecoregion, sub-basins were established based on the concept of natural areas as recognized by Homoya et al. (1985). Site specific data; locality information; and species specific scoring criteria for tolerance classification, trophic guilds, and reproductive guilds are included in the appendix.

Keywords: *Water quality, *Biological indicators, *Indiana, *Water pollution effects(Animals), Corn Belt, Aquatic ecosystems, Fishes, Biota, Biological communities, Surface waters, Environmental quality.

PB93-149425/REB PC A08/MF A02
National Emission Standards for Hazardous Air Pollutants Compliance Extensions for Early Reductions: Background Information for Promulgated Standards.

Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
 Dec 92, 161p EPA/450/3-92/006B
 See also PB92-180132 and PB91-138689.

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Regulations governing compliance extensions for early reductions of hazardous air pollutants are promulgated under the authority of section (612)(f)(5) of the Clean Air Act (CAA). These rules would apply to sources that seek compliance extensions from standards promulgated under section (112)(d) of the CAA. The document contains summaries of public comments received on the proposed rule (56 FR 27338, June 13, 1991), EPA responses and a summary of changes since proposal.

Keywords: *Hazardous materials, *Air pollution standards, *United States, Regulations, National government, Reduction, Chemical compounds, Risk assessment, Emission factors, Compliance, Gases, Proposals, Public opinion, State government, Clean Air Act and Amendments 1990, Particulates, Listings.

PB93-149664/REB PC A01/MF A01
PR Notice 87-11. Notice to Manufacturers, Formulators, Distributors, and Registrants of Pesticides. Environmental Protection Agency, Washington, DC. Office of Pesticide Programs. Dec 87, 4p EPA/540/09-93/256

The document is one in the series of 'Pesticide Regulatory Notices', usually called 'PR Notices', which supplement the laws and regulations governing pesticide regulation in the US. These notices clarify, interpret and explain regulatory requirements and policies. They are directed at pesticide registrants and other parties interested in detailed procedures of regulation.

Keywords: *Regulations, *Pesticides, Directives, Aerosols, US EPA, Requirements, Hazards, Workers, Registration.

PB93-149680/REB PC A02/MF A01
Pesticide Fact Sheet Number 20.1: Amitrole. Environmental Protection Agency, Washington, DC. Office of Pesticide Programs. Sep 92, 8p EPA/540-FS-93/238
 See also PB87-108874 and PB93-144368.

The document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred. (1) Issuance or reissuance of a registration standard, (2) Issuance of each special review document, (3) Registration of a significantly changed use pattern, (4) Registration of a new chemical, or (5) An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

Keywords: *Pesticides, *Toxic substances, Hazardous materials, Chemical properties, Regulations, Toxicology, Ecology, Herbicides, Agricultural products, Path of pollutants, Triazoles, Nitrogen organic compounds, *Chemical Information Fact Sheet, *Amitrole, Use patterns, Science findings, CAS 61-82-5.

PB93-149748/REB PC A04/MF A01
Watershed Manipulation Project: Field Implementation Plan for 1990-1992. Corvallis Environmental Research Lab., OR. H. Erickson, A. M. Narahara, L. E. Rustad, M. Mitchell, and J. Lee. Feb 93, 75p EPA/600/R-93/024
 See also PB91-148403. Prepared in cooperation with ManTech Environmental Technology, Inc., Corvallis, OR., Maine Univ. at Orono. Sawyer Environmental Chemistry Lab., and State Univ. of New York Coll. of Environmental Science and Forestry, Syracuse.

The Bear Brook Watershed in Maine (BBWM) was established in 1986 at Lead Mountain, Maine as part of the Environmental Protection Agency's (EPA) Watershed Manipulation Project (WPM). The goals of the project are to: (1) assess the chemical response of a small upland forested watershed to increased loadings of SO₄, (2) determine interactions among biogeochemical mechanisms controlling watershed response to acidic deposition, and (3) test the assumptions of the Direct/Delayed Response Programs (DDRP) computer models of watershed acidification. The document summarizes the field procedures used in the establishment and initial implementation of the plot- and catchment-scale activities at the BBWM, and outlines plans for 1990-02 project activities.

Keywords: *Water pollution abatement, *Watersheds, *Forest land, *Lead Mountain, Sites, Sampling, Sulfur

oxides, Chemical reactions, Response, Acidification, Deposition, Mathematical models, Soil properties, Precipitation(Meteorology), Oxygen isotopes, Sulfates, Organic acids, Inorganic nitrates, Mobility, Bear Brook Watershed, Acid rain.

PB93-149755/REB PC A04/MF A01
Corvallis Environmental Research Lab., OR.
Episodic Response Project-Northern Appalachian Plateau: Site Description and Methodology. Pennsylvania State Univ., University Park. Environmental Resources Research Inst. D. R. DeWalle, B. R. Swistock, C. L. Dow, W. E. Sharpe, and R. F. Carline. Feb 93, 64p EPA/600/R-93/023
 See also PB91-176057. Prepared in cooperation with Pennsylvania Cooperative Fish and Wildlife Research Unit, University Park, and Northeastern Forest Experiment Station, University Park, PA. Sponsored by Corvallis Environmental Research Lab., OR.

The study areas and methods are described for research on acidic streamflow episodes in five forest stream/catchment systems in the northern Appalachian Plateau region of Pennsylvania. Research was conducted from October 1988 to April 1990 and involved both hydrochemical and biological studies. Hydrochemical monitoring included measurements of stream discharge; in situ stream pH, conductivity, and temperature; air temperature, precipitation amounts and intensity, snowpack water equivalents, and snowpack melt rates. Intensive stream sampling during selected events using computer-controlled automatic samplers was used to document episodic stream chemistry. Stream samples were analyzed for a complete suite of common cations and anions along with acid neutralizing content, DOC, total monomeric aluminum, and organic monomeric aluminum. Biological impacts of acidic streamflow episodes on native brook trout and sculpin were assessed using electrofishing, in-situ bioassays, radiotelemetry, and spawning surveys. A rigorous quality assurance/quality control program was established for all measurements during the study, especially for water chemistry.

Keywords: *Acidification, *Stream flow, *Forest land, *Water pollution abatement, Water chemistry, Monitoring, pH, Atmospheric temperature, Precipitation(Meteorology), Bioassay, Trout, Environmental impacts, Invertebrates, Neutralizing, Chemical reactions, Aluminum, Fishes, Response, Quality control, Sampling, Tables(Data), Appalachian Region(Pennsylvania), Discharge(Water).

PB93-149854/REB PC A02/MF A01
Surfactants and Subsurface Remediation. Journal article. Robert S. Kerr Environmental Research Lab., Ada, OK. C. C. West, and J. H. Harwell. c1992, 9p EPA/600/J-93/005
 Pub. in Environmental Science Technology, v26 n12 p2324-2330, 1992. Prepared in cooperation with Oklahoma Univ. Research Inst., Norman.

Because of the limitations of pump-and-treat technology, attention is now focused on the feasibility of surfactant use to increase its efficiency. Surfactants have been studied for use in soil washing and enhanced oil recovery. Although similarities exist between the applications, there are significant differences in the objectives of the technologies and the limitations placed on surfactant use. In this article we review environmental studies concerned with the fate and transport of surface-active compounds in the subsurface environment and discuss key issues related to their successful use for in situ aquifer remediation, particularly with respect to nonaqueous-phase liquids. (Copyright (c) 1992 American Chemical Society.)

Keywords: *Surfactants, *Remedial action, *Subsurface investigations, *Water pollution control, *Environmental surveys, Aquifers, Environmental transport, Technology utilization, Land pollution control, Chemical properties, Pumping, Feasibility studies, In-situ processing, Solubility, Surface properties, Soil washing.

PB93-149862/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Collection and Chemical Analysis of Lichens for Biomonitoring. Book chapter. Geological Survey, Denver, CO.

L. L. Jackson, J. Ford, and D. Schwartzman. 1991, 22p EPA/600/A-93/009
 Pub. in Manual on 'The Use of Lichens in Air Pollution Monitoring', Chapter 5, 1991. Prepared in cooperation with Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife, and Howard Univ., Washington, DC. Dept. of Geology and Geography. Sponsored by Corvallis Environmental Research Lab., OR.

The chapter discusses the interrelated aspects of biomonitoring using chemical analysis of lichens. Many unique aspects of study objectives, study design (including design tasks, considerations, and sampling schemes), sample collection, sample preparation, and sample analysis that are required for a successful biomonitoring program using chemical analysis are emphasized. The advantages and disadvantages of common analytical methods suitable for chemical analysis of lichens are briefly discussed. Aspects of a quality assurance program and final contract reports are highlighted. In addition, some examples of studies using chemical analysis of lichens are discussed.

Keywords: *Chemical analysis, *Biological indicators, *Lichens, *Environmental monitoring, Air pollution monitoring, Plants(Botany), Biological effects, Case studies, Design criteria, Baseline measurements, Quality assurance, Sampling, Temporal distribution, Spatial distribution, Standards, Quality control, Reprints.

PB93-149904/REB PC A13/MF A03
Environmental Protection Agency, Washington, DC.
Office of Pesticide Programs.
Protection of Pome Fruits, March 1985-May 1992. Citations from AGRICOLA Concerning Diseases and Other Environmental Considerations. Bibliographies and literature of agriculture (Final). National Agricultural Library, Beltsville, MD. C. N. Bebee. Aug 92, 283p USDA/BLA-118
 Sponsored by Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.

The citations in this bibliography, The Protection of Pome Fruits, March 1985 - May 1992, are selected from the AGRICOLA database and cover diseases, insects, nematodes, weeds, chemicals, and other environmental considerations. A previous bibliography in this series was issued as BLA 41 in 1985.

Keywords: *Bibliographies, *Pome fruits, *Pest control, Environmental protection, Fruit crops, Apples, Horticultural crops, Pears, Pesticides, Plant diseases, Food processing, Weed control, Nematodes, Biological control, AGRICOLA database.

PB93-149912/REB PC A09/MF A03
Environmental Protection Agency, Washington, DC.
Office of Pesticide Programs.
Methylbromide and Its Alternatives as Fumigants, 1979-May 1992. Citations from AGRICOLA Concerning Diseases and Other Environmental Considerations. Bibliographies and literature of agriculture (Final). National Agricultural Library, Beltsville, MD. C. N. Bebee. Aug 92, 200p USDA/BLA-120
 Sponsored by Environmental Protection Agency, Washington, DC. Office of Pesticide Programs.

The citations in this bibliography, Methylbromide and Its Alternatives as Fumigants, 1979 - May 1992, are selected from the AGRICOLA database and cover diseases, insects, nematodes, weeds, chemicals, and other environmental considerations.

Keywords: *Methyl bromide, *Pesticides, *Fumigants, *Bibliographies, Insect control, Insecticides, Nematodes, Substitutes, Food processing, Weed control, Fungicides, Soils, Horticultural crops, Forest management, Environmental protection, AGRICOLA database.

PB93-150100/REB PC A02/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.
Characterization of Organic Emission from a Wood Finishing Product-Wood Stain. Journal article. Acurex Corp., Research Triangle Park, NC. J. C. S. Chang, and Z. Guo. c1992, 10p EPA/600/J-93/001
 Contract EPA-68-D0-0141

EPA PUBLICATIONS BIBLIOGRAPHY

Pub. in *Indoor Air* 2, p146-153, 1992. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The paper gives results of the measurement of emission characteristics of four organic compounds (nonane, decane, undecane, and 1,2,4-trimethylbenzene) from a wood finishing product, wood stain, in an environmental chamber. It was found that the emission patterns of the four organic compounds can be described by a two-phase model: phase 1, when the wood stain is relatively wet; and phase 2, when the wood stain becomes relatively dry. The changes of emission mechanisms between phases 1 and 2 were reflected by the significantly different emission and decay rates measured during the two periods. A relationship was found that can be used to predict the relative emission and decay rates of the four organic compounds from the wood stain.

Keywords: *Emission, *Wood, *Stains, *Air pollution control, *Volatile organic compounds, Stationary sources, Mathematical models, Evaporation, Aromatic monocyclic hydrocarbons, Alkanes.

PB93-150118/REB PC A02/MF A01
Pilot-Scale Evaluation of an Incinerability Ranking System for Hazardous Organic Compounds. Journal article.

Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. G. J. Carroll, R. C. Thurnau, J. W. Lee, L. R. Waterland, and B. Dellinger. c1992, 10p EPA/600/J-93/002. Pub. in *Jnl. of the Air and Waste Management Association*, v42 n11 p1430-1436 Nov 92. See also PB90-259854 and PB92-166966. Prepared in cooperation with Acurex Corp./Aerotherm, Mountain View, CA., and Dayton Univ., OH. Research Inst.

The study was conducted to evaluate an incinerability ranking system developed by the University of Dayton Research Institute under contract to the EPA Risk Reduction Engineering Laboratory. Mixtures of organic compounds were prepared and combined with a clay-based sorbent matrix. These mixtures were then fed into the pilot-scale rotary kiln incineration system at the U.S. EPA Incineration Research Facility. In a series of five (5) tests, the following conditions were evaluated: baseline/typical operation; thermal failure; mixing failure; matrix failure; and a worst-case combination of the three (3) failure modes. Under baseline conditions, mixing failure, matrix failure, kiln-exit destruction and removal efficiencies (DREs) for each compound were sufficiently high that separation of compounds according to observed DRE was not possible; a correlation between compound ranking and relative DRE could not be confirmed. A wider distribution of compound DREs during the thermal-failure and worst-case tests allowed for a better statistical evaluation; statistically-significant correlations above the 99% and 93% confidence intervals were identified for the two tests, respectively.

Keywords: *Air pollution control, *Hazardous materials, *Incinerators, *Combustion efficiency, *Ranking, *Organic compounds, Waste disposal, Thermal stability, Flue gases, Statistical analysis, Performance standards, Air pollution sampling, Kilns, Reprints, *Principal organic hazardous constituents.

PB93-150126/REB PC A03/MF A01
Comparative Resistance of 'Escherichia coli' and Enterococci to Chlorination. Journal article.

Environmental Protection Agency, Cincinnati, OH. E. W. Rice, T. C. Covert, D. K. Wild, D. Berman, and S. A. Johnson. c1992, 11p EPA/600/J093/003. Pub. in *Jnl. of Environmental Microbiology and Health* A28, n1 p89-97 1993. See also PB86-158045. Prepared in cooperation with National Inst. for Occupational Safety and Health, Cincinnati, OH.

Pure cultures of *Escherichia coli* and *Enterococcus faecium* were inactivated by free chlorine and monochloramine. Indigenous *E. coli* and enterococci in wastewater effluents were also inactivated. Selective bacteriological media specifically designed for the enumeration of the target microbes were utilized in the study. Results show that enterococci are more resistant than *E. coli* to chlorine disinfection. (Copyright (c) 1992 by Marcel Dekker, Inc.)

Keywords: *Chlorination, *Water pollution control, *Sewage treatment effluents, *Escherichia coli, *En-

terococcus faecium, Bacteria, Enterobacteriaceae, Disinfection, Reprints.

PB93-150134/REB PC A03/MF A01
Removal of Beryllium from Drinking Water by Chemical Coagulation and Lime Softening. Journal article.

Environmental Protection Agency, Cincinnati, OH. Drinking Water Research Div. D. A. Lytle, R. S. Summers, and T. J. Sorg. c1992, 12p EPA/600/J-93/004. Pub. in *Jnl. of Water Supply Research and Technology-AQUA*, v41 n6 p330-339, 1992. Prepared in cooperation with Cincinnati Univ., OH.

The effectiveness of conventional drinking water treatment and lime softening was evaluated for beryllium removal from two drinking water sources. Jar test studies were conducted to determine how common coagulants (aluminum sulfate and ferric chloride) and lime softening performed in removing beryllium from spiked waters. Centrifugation was used to simulate filtration. The two source waters used were raw Ohio River water and groundwater from the Great Miami Aquifer. The impact of initial beryllium concentration, coagulant dose, turbidity and pH on beryllium removal was examined and optimum treatment conditions were determined. Jar tests using alum and ferric chloride coagulants were able to achieve 95% and 85% removal of beryllium respectively from surface water. Removal efficiency increased as the pH was increased. Based on the data collected in the study, coprecipitation and precipitation are the two likely mechanisms responsible for beryllium removal.

Keywords: *Beryllium, *Potable water, *Water treatment, Centrifuging, Coagulants, Removal, Calcium oxides, Ground water, Ohio River, Tests, Aluminum sulfate, Concentration(Composition), Surface waters, Performance evaluation, Alums, Iron chlorides, pH, Turbidity, Reprints, *Drinking water, Lime softening.

PB93-150142/REB PC A02/MF A01
Extraction and Recovery of Lead Species from Soil. Journal article.

Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. S. Krishnamurthy. c1992, 8p EPA/600/J-93/006. Pub. in *Environmental Progress*, v11 n4 p256-260 Nov 92. See also PB87-142378.

The remediation of lead contaminated soil at Superfund and urban soil is a serious concern, given the grave effects of lead exposure and the pervasive nature of the threat. The lead species of interest are elemental lead, lead sulfate, basic carbonate of lead and lead dioxide. These species were solubilized in a three step process, using pure chemicals and the total lead was recovered as lead sulfate. Bench scale experiment were done using a soil that was dosed with varying amounts of the contaminants (Total lead from 1,000 to 10,000 ppm.). Better than 80% of the contaminants was recovered as lead sulfate, using the three step process. The treated soil passed the TCLP test with 3.0 ppm of lead, showing that it could be redeposited on site. A pilot plant scale-up is being explored.

Keywords: *Soil treatment, *Lead(Metal), *Remedial action, *Land pollution control, *Lead inorganic compounds, Superfund, Urban areas, Materials recovery, Lead sulfates, Extraction, Lead oxides, Solubilization, Experimental design, Soil contamination, Lead carbonates, Toxicity Characteristic Leaching Procedure.

PB93-150159/REB PC A03/MF A01
Control Technology: 1992 Update of U.S. EPA's Superfund Innovative Technology Evaluation (SITE) Emerging Technology Program. Journal article.

Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. N. M. Lewis, N. P. Barkley, and T. Williams. c1992, 14p EPA/600/J-93/007. Pub. in *Jnl. of the Air and Waste Management Association*, v42 n12 p1644-1656 Dec 92. See also PB92-224294.

The Superfund Innovative Technology Evaluation (SITE) Emerging Technology Program (ETP) has encouraged and financially supported further development of bench- and pilot-scale testing and evaluation of innovative technologies suitable for use at hazardous waste sites for five years. The ETP was estab-

lished under the Superfund Amendments and Reauthorization Act (SARA) of 1986. The ETP complies with the goal of the SITE Program to promote, accelerate and make commercially available the development of alternative/innovative treatment technologies for use at Superfund sites. Technologies are submitted to the ETP through yearly solicitations for Preproposals. Facilities, equipment, data collection, performance and development are monitored throughout the project. The U.S. Department of Energy (DOE) and the U.S. Air Force (USAF) are participants in the ETP. DOE has co-funded ETP projects since 1990 and the USAF since 1991. A primary goal of the ETP is to move developed technologies to the field-demonstration stage. Therefore, a developer may be considered for participation in the SITE Demonstration Program provided performance in the ETP indicates the technology is field-ready for demonstration and evaluation.

Keywords: *Hazardous materials, *Technology innovation, *Waste management, Alternatives, Superfund, Performance evaluation, Field tests, Funds, Incineration, Remedial action, Biological treatment, Physical treatment, Trends, Stabilization, Solidification, Materials handling, Reprints, *Superfund Innovative Technology Evaluation Program, *Innovative treatment technologies, Chemical treatment.

PB93-150167/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.

Role of Nitrate in the Acidification of Streams in the Catskill Mountains of New York. Journal article. Geological Survey, Albany, NY. P. S. Murdoch, and J. L. Stoddard. c1992, 16p EPA/600/J-93/008. Contract EPA-68-C8-0006. Pub. in *Water Resources Research*, v28 n10 p2707-2720 Oct 92. Prepared in cooperation with ManTech Environmental Technology, Inc., Corvallis, OR. Sponsored by Corvallis Environmental Research Lab., OR., and New York City Dept. of Environmental Protection.

Research on the effects of acidic deposition in the United States has focused largely on the role of sulfur deposition in the acidification of surface waters. Results from both long-term (up to 70 years) and recent monitoring of stream chemistry in the Catskill Mountains of New York indicate, however, that nitric acid has a significant and increasing role in surface water acidification that, during high-flow periods, rivals the role of sulfuric acid. Nitrate increases with increased stream flow throughout the year except during the late summer, when biological activity and its attendant nitrogen uptake are greatest; peak concentrations as high as 128 micrograms/l have been recorded during spring snowmelt. In contrast, sulfate concentrations decrease with increased flow. (Copyright (c) 1992 by the American Geophysical Union.)

Keywords: *Water pollution sampling, *Acidification, *Inorganic nitrates, *Streams, Stream flow, Air water interactions, Deposition, Nitric acid, Catskill Mountains, New York, Surface waters, Long term effects, Water chemistry, Data collection, Runoff, Biological effects, Reprints.

PB93-150175/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.

Genetically Engineered Baculoviruses as Agents for Pest Control. Journal article. Boyce Thompson Inst. for Plant Research, Ithaca, NY. H. A. Wood, and R. R. Granados. c1991, 21p Grants EPA-R-815831-01-0, USDA-88037263-3700. Pub. in *Annual Reviews Microbiology* 45, p69-87, 1991. Sponsored by Corvallis Environmental Research Lab., OR., Department of Agriculture, Washington, DC., and Forest Service, Washington, DC.

Baculoviruses constitute one of the largest and most diverse groups of insect pathogenic viruses. Numerous experimental field trials between 1950 and 1960 demonstrated the usefulness of baculoviruses as viral insecticides; however, with the concurrent advent of numerous synthetic pesticides with broad-spectrum, low cost, and high insecticidal activity, viral insecticides failed to become a commercial success. During the late 1970s and throughout the 1980s it became clear that the overdependence on chemical pesticides for pest control created numerous unacceptable agricultural, environmental, and human-health problems. The paper examines the current status of pesticial baculoviruses, their genetic improvement, and the field-release testing of modified viruses.

EPA PUBLICATIONS BIBLIOGRAPHY

Keywords: *Baculoviridae, *Biological insect control, *Pest control, Genetic engineering, Field tests, Reprints.

PB93-150191/REB PC A02/MF A01
Sorption of Toxic Organic Compounds on Wastewater Solids: Mechanism and Modeling. Journal article.
 Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
 L. Wang, R. Govind, and R. A. Dobbs. c1992, 9p EPA/600/J-93/011
 Pub. in Environmental Science and Technology, v27 n1 p152-158 Jan 93. See also PB86-218427. Prepared in cooperation with Cincinnati Univ., OH. Dept. of Chemical Engineering.

Sorption of toxic organic compounds on wastewater solids is an important process in conventional biological wastewater treatment systems. The extent of accumulation of toxic organic compounds by sorption onto wastewater solids not only affects the efficiency of the treatment system, but also impacts the management of wastewater solids. The study is an attempt to propose a mechanism for understanding the sorption phenomenon and to develop a model for sorption on wastewater solids based on the proposed mechanism. It was postulated that sorption was a combination of two processes: adsorption and partitioning. A sorption model was developed for both single component and multicomponent systems. The model was tested using single component experimental isotherm data of eight toxic organic compounds.

Keywords: *Sewage treatment, *Sorption, *Solids, *Organic compounds, Adsorption, Separation, Mathematical models, Toxic substances, Experimental design, Activated sludge process, Comparison, Activated carbon treatment, Reprints, *Waste water solids.

PB93-150209/REB PC A05/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab. Characterization of PM-10 Emissions from Antiskid Materials Applied to Ice- and Snow-Covered Roadways. Final rept.
 Midwest Research Inst., Kansas City, MO.
 J. S. Kinsey. Jan 93, 82p EPA/600/R-93/019
 Contract EPA-68-DO-0137
 See also PB-273 518, PB84-223734, PB86-239787, PB88-196225 and PB90-183658. Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Air and Energy Engineering Research Lab.

The report gives results of a field program to establish a predictive model for PM-10 (particulate matter with diameters = or < 10 micrometers) emissions. (NOTE: Several areas of the U.S. in violation of the National Ambient Air Quality Standard for PM-10 have conducted studies that have identified the resuspension of antiskid material applied to paved roads as an important source of PM-10. The application of antiskid materials creates a temporary but substantial increase in the amount of fine particulate on the road surface over and above that which is normally present. Measured emission data are lacking for all types of antiskid materials.) A source-oriented emissions sampling procedure was conducted on a section of US 53 just west of Duluth, MN, during March/April 1992. The only general observation made was that PM-10 emissions appear to increase with the amount of antiskid material applied. A comparison of measured emission factors with those predicted by an EPA compilation of air pollutant emission factors indicated that most of the measured factors are higher than those predicted from silt-load-ing.

Keywords: *Particulates, *Air pollution sampling, *Emission factors, *Deicers, *Roads, *Skid resistance, Ice control, Mathematical models, Concentration(Composition), Quality assurance, Site surveys, Field tests, Quality assurance.

PB93-150217/REB PC A16/MF A03
Robert S. Kerr Environmental Research Lab., Ada, OK. DNAPL Site Evaluation. Research rept.
 GeoTrans, Inc., Sterling, VA.
 R. M. Cohen, and J. W. Mercer. Feb 93, 363p EPA/600/R-93/022
 Contract EPA-68-C8-0058

See also PB92-178938. Sponsored by Robert S. Kerr Environmental Research Lab., Ada, OK.

Dense nonaqueous-phase liquids (DNAPLs), especially chlorinated solvents, are among the most prevalent subsurface contaminants identified in ground-water supplies and at waste disposal sites. There are several site-characterization issues specific to DNAPL sites including: (a) the risk of inducing DNAPL migration by drilling, pumping or other field activities; (b) the use of special sampling and measurement methods to assess DNAPL presence and migration potential; and (c) development of a cost-effective characterization strategy that accounts for DNAPL chemical transport processes, the risk of inducing DNAPL movement during field work, and the data required to select and implement a realistic remedy. The manual provides information to address these issues and describes and evaluates activities that can be used to determine the presence, fate and transport of subsurface DNAPL contamination.

Keywords: *Site characterization, *Ground water, *Water pollution, *Waste disposal, *Hazardous materials, Chlorine organic compounds, Solvents, Land pollution, Environmental transport, Sampling, Remedial action, Subsurface investigations, Mathematical models, Case studies, *Dense nonaqueous phase liquids.

PB93-150258/REB PC A20/MF A04
Control Techniques for Volatile Organic Compound Emissions from Stationary Sources, December 1992. Final rept.
 Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. Dec 92, 466p EPA/453/R-92/018
 See also PB83-111708 and PB-284 804.

The document is a summary document containing general information on sources of volatile organic compound (VOC) emissions, applicable control techniques, and the impacts resulting from control applications. It references other documents which contain much more detailed information on individual sources and control techniques. This is the third edition of a report originally published by the Department of Health, Education, and Welfare (HEW) titled, 'Control Techniques for Hydrocarbon and Organic Solvent Emissions from Stationary Sources (AP-68)'. The first edition was published in March 1970 by the National Air Pollution Control Administration, a part of HEW.

Keywords: *Volatile organic compounds, *Air pollution control, *Stationary sources, Emission factors, Economic analysis, Air pollution control equipment, Industrial wastes, Combustion products, Refineries, Coatings, Chemical industry.

PB93-150290/REB PC A05/MF A01
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards. Highlights of the EPA Innovative Regulatory Strategies Workshop: Market-Based Incentives and other Innovations for Air Pollution Control. Summary of Workshop Discussion Sessions. Held in Washington, DC, on January 15-17, 1992.
 Radian Corp., Research Triangle Park, NC.
 Jun 92, 87p EPA/452/S-92/001
 Contract EPA-68-DO-125
 Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.

The Clean Air Act Amendments of 1990 allow, and in some cases require, States to adopt market-based strategies or other innovative types of air pollution control. The U.S. Environmental Protection Agency's (EPA's) innovative regulatory strategies program seeks to encourage and facilitate, as appropriate, the development, demonstration, and implementation of a wide range of innovative regulatory air pollution programs, including market-based, informational, and pollution prevention approaches. The 3-day national workshop, attended by over two hundred people from Federal, State, and local agencies, industry, environmental and public interest groups, and the academic community highlighted issues associated with a variety of innovative, market-based strategies which are currently being developed or used by State and local authorities around the country.

Keywords: *US EPA, *Project planning, *Air pollution control, *Meetings, Requirements, States(United

States), Regulations, Market research, Industries, Local government, Taxes, Fees, Sources, Automobiles, Publicity, Licenses, Reduction, Clean Air Act of 1990, Strategic planning, Alternative fuels.

PB93-152577/REB PC A06/MF A02
Publications Office of Science and Technology: Catalog.
 Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.
 Sep 92, 107p EPA/820/B-92/002

The catalog lists documents produced by the Office of Science and Technology that are available from the Water Resource Center and the National Technical Information Service.

Keywords: *Catalogs(Publications), *Water pollution, *Water resources, *Bibliographies, Economic analysis, Industrial waste treatment, Clean Water Act, Safe Drinking Water Act, Waste water, *Office of Science and Technology, Water quality criteria.

PB93-152601/REB PC A99/MF A06
Proceedings of the Annual EPA Conference on Analysis of Pollutants in the Environment (15th). Held in Norfolk, Virginia on May 6-7, 1992.
 Environmental Protection Agency, Washington, DC. Engineering and Analysis Div.
 Dec 92, 736p EPA/821/R-92/007

The document contains the information presented at the Fifteenth Annual EPA Conference on Analysis of Pollutants in the Environment. It includes papers presented as well as graphs and charts shown.

Keywords: *Environmental surveys, *Meetings, *Pollutants, *Chemical analysis, Graphs(Charts), Tables(Data), Pollution abatement, Environmental protection, Analytical techniques, Pollution sources.

PB93-152619/REB PC A22/MF A04
Proceedings: Tiered Testing Issues for Freshwater and Marine Sediments. Held in Washington, DC, on September 16-18, 1992.
 Environmental Protection Agency, Washington, DC. Office of the Assistant Administrator for Water.
 Sep 92, 517p EPA/823/R-93/001

The proceedings summarize workshop presentations and plans of work to be completed to develop sediment bioassay protocols for freshwater and marine species, including outlines of workshop presentations, and copies of slides and graphics.

Keywords: *Meetings, *Sediments, *Toxicity, *Bioaccumulation, *Water pollution effects, Bioassay, Freshwater, Marine biology, Sediment water interfaces, Aquatic biology, Tests, Standards, Ecosystems, Graphs(Charts), Tables(Data).

PB93-156040/REB PC A03/MF A01
Modification of Point Counts for Surveying Cropland Birds. Symposium paper.
 Corvallis Environmental Research Lab., OR.
 K. Freemark, and C. Rogers. 1993, 26p EPA/600/A-93/018
 See also PB93-156057 and MIC-91-04443. Prepared in cooperation with National Wildlife Research Centre, Ottawa (Ontario).

The extensive use of commercially-synthesized pesticides and fertilizers in modern agriculture has significant implications for farmland wildlife. The Canadian Wildlife Service has used the recent trend toward alternative agriculture to develop a comparative field study for evaluating the ecotoxicological impact of agricultural use. A point-count based study by Brae et al. in Denmark indicated the potential utility of comparing avifauna on organic and chemical farms. In adapting the Danish approach for Canada, the authors evaluated point counts as a method for surveying birds in and adjacent to cropland and thereby potentially exposed to agrichemicals. As part of a comparative study of agricultural impacts on wildlife, modifications to the point count method were evaluated for surveying birds in and adjacent to cropland during the breeding season (May-early July) in Ontario.

Keywords: *Farm crops, *Birds, *Surveys, *Canada, Wildlife, Abundance, Ecosystems, Toxicology, Pesti-

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cides, Fertilizers, Farms, Environmental impacts, Breeding, Seasonal variations, Methodology, *Foreign technology, *Ontario, Point count method.

PB93-156057/REB PC A03/MF A01
Corvallis Environmental Research Lab., OR.
Evaluating Point Count versus Territory Mapping in Cropland Birds. Symposium paper.
Sherbrooke Univ. (Quebec). Dept. de Biologie.
A. Cyr, D. LePage, and K. Freemark. Oct 82, 20p EPA/600/A-93/019

See also PB93-156040. Prepared in cooperation with Laval Univ., Quebec. Dept. de Biologie, and Canadian Wildlife Service, Ottawa (Ontario). Sponsored by Corvallis Environmental Research Lab., OR.

Species richness, composition and abundance of farmland birds were compared between point counts (50, 100, and 150 m radius half circles) and territory mapping on three 40 ha plots in Quebec, Canada. Point counts of smaller radii tended to have larger density estimates than counts of larger radii. Territory mapping detected 10 more species than 150 m-radius point counts. Territory mapping at 150 m radius detected more birds per species than point counts; relative abundances however were similar. Bird density is probably optimally estimated with a 100 m-radius point count. After four visits, more than 80% of species and birds from seven visits had been detected by 150 m radius point counts. The modified point count method appears to be accurate enough to reflect the farmland avifauna characterized by more labor intensive methods such as territory mapping.

Keywords: *Farms, *Birds, *Mapping, *Canada, Comparison, Abundance, Wildlife, Density(Mass/volume), Species diversity, Estimates, Accuracy, Agriculture, Pesticides, *Foreign technology, *Quebec, Point count method, Territorial mapping.

PB93-156107/REB PC A03/MF A01
Cost Effectiveness Analysis of Effluent Guidelines and Standards for the Aluminum Forming Category.
Environmental Protection Agency, Washington, DC. Office of Water Regulations and Standards.
Sep 83, 50p
See also PB91-145441, PB84-244433 and PB84-244425.

The paper reports the results of a cost-effectiveness analysis of alternative water pollution control technologies for the aluminum forming category.

Keywords: *Metal working, *Aluminum industry, *Cost effectiveness, *Water pollution control, Standards, US EPA, Clean Water Act, Sources, Economic impact, Operating costs, Periodic variations, Toxicity, Fluid filtration, Activated carbon treatment, Removal, Best available technology, Pre-treatment(Water), Industrial water.

PB93-156495/REB PC A04/MF A01
Environmental Protection Agency, Washington, DC. Office of Analysis and Evaluation.
Economic Analysis of the Phosphate Subcategory of the Fertilizer Manufacturing Industry: Louisiana Phosphoric Acid Plants.
Development Planning and Research Associates, Inc., Manhattan, KS.
Feb 84, 73p
Contract EPA-68-01-7644
See also PB-265 062 and PB-300 681. Sponsored by Environmental Protection Agency, Washington, DC. Office of Analysis and Evaluation.

The report analyzes the economic impact of various point source control alternatives for the Phosphate Subcategory of the Fertilizer Manufacturing Industry. It focuses on the impacts resulting from the remedial control options currently under consideration for the four phosphoric acid plants located in Louisiana.

Keywords: *Economic impact, *Industrial plants, *Fertilizers, *Regulations, *Pollution control, Phosphoric acids, Manufacturing, Cost estimates, Operating costs, Production, Prices, Financing, Tables(Data), Employment, Louisiana, Point sources.

PB93-156503/REB PC A05/MF A01
Environmental Protection Agency, Washington, DC. Office of Analysis and Evaluation.

Economic Analysis of the Phosphate Subcategory of the Fertilizer Manufacturing Industry: Louisiana Phosphoric Acid Plants, July 1986.

Development Planning and Research Associates, Inc., Manhattan, KS.
Jul 86, 88p
Contract EPA-68-01-6744

See also PB93-156495. Sponsored by Environmental Protection Agency, Washington, DC. Office of Analysis and Evaluation.

The purpose of the report is to provide an economic analysis of the various remedial regulatory options under study for the four phosphoric acid plants. The direct firm level impacts as well as the overall industry impacts are examined.

Keywords: *Economic analysis, *Industrial plants, *Fertilizers, *Regulations, *Pollution control, Phosphoric acids, Manufacturing, Cost analysis, Sulfuric acid, Ammonia, Production, Prices, Sales, Land disposal, Slurries, Waste disposal, Rivers, Pipelines, Louisiana, Remedial options.

PB93-156552/REB PC A08/MF A02
Hazardous Air Pollutant Emissions from Process Units in the Synthetic Organic Chemical Manufacturing Industry: Background Information for Proposed Standards. Volume 1A. National Impacts Assessment. Draft rept.

Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
Nov 92, 162p EPA/453/D-92/016A
See also Volume 1B, PB93-156560, Volume 1C, PB93-156578 and PB93-143972.

A draft rule for the regulation of emissions of organic hazardous air pollutants (HAP's) from chemical processes of the synthetic organic chemical manufacturing industry (SOCMI) is being proposed under the authority of Sections 112, 114, 116, and 301 of the Clean Air Act, as amended in 1990. The volume of the Background Information Document presents the results of the national impacts assessment for the proposed rule.

Keywords: *Hazardous materials, *Volatile organic compounds, *Air pollution control, *Standards, *United States, Regulations, Chemical plants, US EPA, Chemical engineering, Economic impact, Assessments, Models, Sources, Emission, Air pollution control equipment, Leakage, Storage tanks, Cost control, Waste treatment, Tables(Data), *Environmental impact statements draft.

PB93-156560/REB PC A13/MF A03
Hazardous Air Pollutant Emissions from Process Units in the Synthetic Organic Chemical Manufacturing Industry: Background Information for Proposed Standards. Volume 1B. Control Technologies. Draft rept.

Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
Nov 92, 294p EPA/453/D-92/016B
See also Volume 1A, PB93-156552 and Volume 1C, PB93-156578.

A draft rule for the regulation of emissions of organic hazardous air pollutants (HAP's) from chemical processes of the synthetic organic chemical manufacturing industry (SOCMI) is being proposed under the authority of Sections 112, 114, 116, and 301 of the Clean Air Act, as amended in 1990. The volume of the Background Information Document presents discussions of control technologies used in the industry and the costs of those technologies.

Keywords: *Hazardous materials, *Volatile organic compounds, *Chemical plants, *Air pollution control, *Standards, States(United States), Chemical engineering, Storage tanks, Waste water, Vents, Leakage, Air pollution control equipment, Waste treatment, Incinerators, Economic impact, Boilers, Cost analysis, Tables(Data), *Environmental impact statements - draft.

PB93-156578/REB PC A11/MF A03
Hazardous Air Pollutant Emissions from Process Units in the Synthetic Organic Chemical Manufacturing Industry: Background Information for Proposed Standards. Volume 1C. Model Emission Sources. Draft rept.
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
Nov 92, 232p EPA/453/D-92/016C
See also Volume 1B, PB93-156560 and Volume 1A, PB93-156552.

A draft rule for the regulation of emissions of organic hazardous air pollutants (HAP's) from chemical processes of the synthetic organic chemical manufacturing industry (SOCMI) is being proposed under the authority of Sections 112, 114, 116, and 301 of the Clean Air Act, as amended in 1990. The volume of the Background Information Document presents model emission sources that were developed to evaluate the national impacts of the proposed rule.

Keywords: *Hazardous materials, *Volatile organic compounds, *Chemical plants, *Air pollution control, *Standards, States(United States), Chemical engineering, Storage tanks, Waste water, Chemical reactor, Vents, Leakage, Sources, Models, Economic impact, Cost analysis, Air pollution control equipment, Boilers, Emission, Tables(Data), Clean Air Act, *Environmental impact statements - draft.

PB93-156586/REB PC A11/MF A03
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
Alternative Control Techniques Document. NOx Emissions from Stationary Gas Turbines.
Midwest Research Inst., Cary, NC.
R. B. Snyder. Jan 93, 249p EPA/453/R-93/007
Contract EPA-68-D1-0115
Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.

The Alternative Control Techniques document describes available control technologies for reducing NOx emissions levels from stationary combustion gas turbines. Information on the formation of NOx and uncontrolled NOx emissions from gas turbines is included. Water injection, steam injection, and low-NOx combustors, used independently or in combination with selective catalytic reduction (SCR), are discussed. Achievable controlled NOx emissions levels, costs and cost effectiveness, and environmental impacts are presented and applicability to new equipment as well as retrofit applications is discussed. The application of these technologies to gas turbines operating in off-shore platform applications is included. Information on the use of alternate fuels, catalytic combustion, and selective noncatalytic reduction (SNCR) to reduce NOx emissions is also briefly presented.

Keywords: *Nitrogen oxides, *Combustion products, *Gas turbines, *Air pollution control, Catalytic combustors, Environmental impacts, Cost effectiveness, Steam injection, Fluid injection, Stationary pollutant sources, Stabilized platforms, Natural gas, Oils, Graphs(Charts), Heat measurement, Reduction, Alternate fuels.

PB93-157105/REB PC A10/MF A03
Compilation of Air Pollutant Emission Factors. Volume 1. Stationary Point and Area Sources. Supplement E.
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
Oct 92, 219p EPA-42-SUPPLE-E
See also Supplement D, PB92-126945.

In the Supplement to the Fourth Edition of AP-42 Volume I, new or revised emissions data are presented for Anthracite Coal Combustion; Natural Gas Combustion; Liquefied Petroleum Gas Combustion; Wood Waste Combustion In Boilers; Bagasse Combustion In Sugar Mills; Residential Fireplaces; Residential Wood Stoves; Waste Oil Combustion; Automobile Body Incineration; Conical Burners; Open Burning; Stationary Gas Turbines for Electricity Generation; Heavy Duty Natural Gas Fired Pipeline Compressor Engines; Gasoline and Diesel Industrial Engines; Large Stationary Diesel and All Stationary Dual Fuel Engines; Soap and Detergents; and Storage of Organic Liquids.

EPA PUBLICATIONS BIBLIOGRAPHY

Keywords: *Emission, *Air pollution, *Volatile organic compounds, *Stationary pollutant sources, Combustion products, Anthracite, Natural gas, Coal gas, Boilers, Gasoline, Internal combustion engines, Diesel engines, Industrial wastes, Oils, Tables(Data), Point sources, Emission factors.

PB93-157550/REB **PC A07/MF A02**
Robert S. Kerr Environmental Research Lab., Ada, OK.
LNAPL Distribution and Hydrocarbon Vapor Transport in the Capillary Fringe.
Massachusetts Univ., Amherst. Environmental Engineering Program.
D. W. Ostendorf, E. E. Moyer, R. J. Richards, E. S. Hinklein, and Y. Xie. Dec 92, 142p EPA/600/R-92/247
Grant EPA-R-816821
See also PB91-171538 and PB91-207035. Sponsored by Robert S. Kerr Environmental Research Lab., Ada, OK.

Vertical distributions of water and light nonaqueous phase liquid (LNAPL) from a well documented aviation gasoline spill at the US Coast Guard Air Station in Traverse City, Michigan were measured. Two field sampling methods for the determination of LNAPL content were presented. Existing models for the free and residual LNAPL profiles described the data with calibrated error standard deviations ranging from 14 to 23% in magnitude. A field trapping protocol was also developed with sample ports fabricated in the intact core sleeves as part of the trapping method, which yielded total hydrocarbon concentration data consistent with independent data from a tubing cluster. The evaporation of 2,2,4 trimethylpentane and 2,2,5 trimethylhexane vapors from the LNAPL was measured in the laboratory under diffusive and advective conditions to simulate soil venting and sparging. The data and theory suggested that lower soil venting or sparging flow rates were in principle as effective as higher rates in stripping gasoline vapors from contaminated soils. The biodegradation of hydrocarbon vapors in soil microcosms obtained aseptically from the site was also documented.

Keywords: *Aviation gasoline, *Hydrocarbons, *Soils, Sampling, Liquid wastes, Spatial distribution, Vapors, Plumes, Concentration(Composition), Capillary water, Venting, Flow rate, Degradation, Microorganisms, *Gasoline spills, Traverse City(Michigan), NAPL(Nonaqueous phase liquid).

PB93-157568/REB **PC A03/MF A01**
Environmental Protection Agency, Chicago, IL. Great Lakes National Program Office.
Cost Effective Corn and Soybean Production Without Tillage: Fact or Fiction (May 1988).
Purdue Univ., Lafayette, IN. Dept. of Agricultural Economics.
J. J. Fletcher, and S. B. Lovejoy. 1993, 22p EPA/905/9-91/010, GL-011/91
Grant EPA-R005805
See also PB88-209838 and PB88-209846. Sponsored by Environmental Protection Agency, Chicago, IL. Great Lakes National Program Office.

Using farm level data developed in conjunction with the Lake Erie Conservation Tillage Demonstration Project, the authors show that farmers can manage reduced tillage systems to maintain yields and increase profits. While the specific results are not applicable to all areas, the findings do show that farmers are able to manage emerging tillage technologies effectively.

Keywords: *Corn plants, *Soybean plants, *Farm management, Reduction, Cultivation, Yield, Cost effectiveness, Herbicides, Field tests, Cost estimates, Seeds, Drying, Profits, Indiana, *Lake Erie Conservation Tillage Demonstration Project.

PB93-157923/REB **PC A02/MF A01**
Construction, Monitoring, and Performance of Two Soil Liners. Project Summary.
Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.
I. G. Krapac, K. Cartwright, B. R. Hensel, B. L. Herzog, and T. H. Larson. Sep 92, 6p EPA/600/S-92/024
See also PB92-124049.

A prototype soil liner and a field-scale soil liner were constructed to test whether compacted soil barrier systems could be built to meet the standard set by the U.S. Environmental Protection Agency (EPA) for satu-

rated hydraulic conductivity ($< \text{or} = 10$ to the 7th power cm/s). In situ ponded infiltration rates into the prototype liner were measured with the use of two large (5 m diameter), sealed double-ring infiltrometers. The saturated hydraulic conductivity of the liner was estimated from the infiltration data to be no more than 3.6×10 to the minus 8th power cm/s. Measurements of soil tension using pressure transducer tensionmeters indicated that the wetting front had reached a depth greater than 20 cm.

Keywords: *Soils, *Linings, *Barriers, *Standards, Hydraulic conductivity, Prototypes, Fluid infiltration, Test methods, Dyes, Measurement, Water flow, Tensionmeters, Specifications, Darcys law, Performance evaluation, Glacial till, Construction.

PB93-157931/REB **PC A03/MF A01**
Method 524. Measurement of Purgeable Organic Compounds in Drinking Water by Gas Chromatography/Mass Spectrometry.
Environmental Monitoring and Support Lab.-Cincinnati, OH. Physical and Chemical Methods Branch.
A. Alford-Stevens, J. W. Eichelberger, and W. L. Budde. Feb 83, 34p EMSL-1435
See also PB84-157916.

The report includes a method that provides procedures for identification and measurement of purgeable organic compounds in finished drinking water, raw source water, or drinking water in any treatment stage. The method is applicable to a wide range of organic compounds that have sufficiently high volatility and low water solubility to be removed from water samples with purge and trap procedures.

Keywords: *Measurement, *Volatile organic compounds, *Water supply, *Water treatment, Identifying, Purging, Traps, Laboratories, Removal, Detection, Test methods, Quality control, Gas chromatography, *Drinking water.

PB93-158988/REB **PC A07/MF A02**
Environmental Protection Agency, Washington, DC. Office of Solid Waste.
Economic Impacts of RCRA Regulations on the Plating and Polishing Industry. Final draft rept.
Development Planning and Research Associates, Inc., Manhattan, KS.
Mar 84, 138p P-536
Contract EPA-68-01-6621
See also PB83-165803 and PB89-238182. Sponsored by Environmental Protection Agency, Washington, DC. Office of Solid Waste.

The study estimates the potential economic impacts of the Resource Conservation Recovery Act regulations upon the plating and polishing industry.

Keywords: *Electroplating, *Metal finishing, *Waste management, *Cost analysis, *Regulations, Hazardous materials, Industrial wastes, Economic impact, Markets, Production, Competition, Manufacturing, Employment, Financial management, Compliance, *Resource Conservation and Recovery Act, Metal industry, Least cost treatment.

PB93-500221/REB **CP D03**
Industrial Source Complex Short Term (ISCST) (for Microcomputers). Model-Simulation.
Environmental Protection Agency, Washington, DC. Office of Science and Technology.
Oct 92, 1 diskette EPA/SW/DK-93/004
System: IBM PC or compatible; MS DOS operating system. Language: FORTRAN. Data is in compressed format. Model contains executable files for microcomputer. Supersedes PB90-500257.
The software is on one 3 1/2 inch diskette, 1.44M high density. Documentation included; may be ordered separately as PB92-232446, PB92-232453, PB92-232461, and PB92-232479.

The model is a steady-state Gaussian plume model which can be used to assess pollutant concentrations from a wide variety of sources associated with an industrial source complex. It can account for settling and dry deposition of particulates, downwash, area, line and volume sources, plume rise as a function of downwind distance, separation of point sources, and limited terrain adjustment. Average concentration or total deposition may be calculated in 1,2,3,4,6,8,12 and/or 24 hour periods. An 'N' day average concentration (or

total deposition) over the total number of hours may also be computed.

Keywords: *Models-Simulation, *Software, *Air pollution, *Industrial waste, Plumes, Concentration(Composition), Air quality, Particulates, Point sources, Meteorology, Atmospheric diffusion, Diskettes.

PB93-500270/REB **CP D02**
Organic Contract Compliance Screening System (OCCSS) Software (OLM01.8 Version 3) (for Microcomputers). Software.
Environmental Protection Agency, Washington, DC. Hazardous Site Evaluation Div.
1992, 1 diskette EPA/SW/DK-93/002
System: IBM AT/PS2 or compatible; MS DOS Version 3.3 operating system. Language: Base SAS. Supersedes PB92-502202. See also PB92-501501 (SOW 2/88/Vers. 6/90), and PB92-501527 (SOW 3/90). Other formats available as PB93-500288 (ICCSS).
The software is on one 5 1/4 inch diskette, 1.2M high density. File format: Executable Code. Documentation included; may be ordered separately as PB92-169564.

OCCSS software is a version of a mainframe-based application developed for the U.S. Environmental Protection Agency's National Contract Laboratory Program (CLP). OCCSS is designed to automate the determination of contractual compliance and completeness of data submitted to the EPA under the Routine Analytical Services (RAS) programs of CERCLA (Comprehensive Environmental Response Compensation and Liability Act). In order to remain consistent with the mainframe system, the PC version of OCCSS is written in SAS, and requires that SAS/PC be installed on the host PC. It will load analytical data from diskettes into SAS file format, perform technical edits on data, produce technical defect and summary reports, and reproduce forms which contain defects. In addition, OCCSS includes software to assist in identifying these critical structural defects in the data format, to assist in identifying these for correction prior to performing technical edits.

Keywords: *Software, *Environmental surveys, *Organic compounds, *Waste management, *Analytical chemistry, Diskettes, US EPA, Compliance, Superfund, Data compilation, Hazardous materials, Data base management, Laboratories, *Organic Contract Compliance Screening System, National Contract Laboratory Program, Comprehensive Environmental Response Compensation and Liability Act.

PB93-500288/REB **CP D02**
Inorganic Contract Compliance Screening System (ICCSS) Software (ILM02.1 Version 2) (for Microcomputers). Software.
Environmental Protection Agency, Washington, DC. Hazardous Site Evaluation Div.
1992, 1 diskette EPA/SW/DK-93/003
System: IBM AT/PS2, or compatible; MS DOS Version 3.3 operating system. Language: Base SAS. Supersedes PB92-501519. Other formats available as PB93-500270 (OCCSS).
The software is on one 5 1/4 inch diskette, 1.2M high density. File format: Executable Code. Documentation included; may be ordered separately as PB92-145598.

ICCSS software is a version of a mainframe-based application developed for the U.S. Environmental Protection Agency's National Contract Laboratory Program (CLP). OCCSS is designed to automate the determination of contractual compliance and completeness of data submitted to the EPA under the Routine Analytical Services (RAS) programs of CERCLA (Comprehensive Environmental Response Compensation and Liability Act). In order to remain consistent with the mainframe system, the PC version of ICCSS is written in SAS, and requires that SAS/PC be installed on the host PC. It will load analytical data from diskettes into SAS file format, perform technical edits on data, produce technical defect and summary reports, and reproduce forms which contain defects. In addition, OCCSS includes software to assist in identifying these critical structural defects in the data format, to assist in identifying these for correction prior to performing technical edits.

Keywords: *Software, *Waste management, *Analytical chemistry, *Environmental surveys, *Inorganic compounds, Diskettes, Data base management, Laboratories, Superfund, US EPA, Data compilation, Haz-

EPA PUBLICATIONS BIBLIOGRAPHY

ardous materials, Compliance, *Inorganic Contract Compliance Screening System, National Contract Laboratory Program, Comprehensive Environmental Response Compensation and Liability Act.

PB93-500684/REB CP D02
ADL Migration Estimation Model (for Microcomputers) (Release Number 1). Software. Environmental Protection Agency, Washington, DC. Office of Pollution, Prevention, and Toxics. Sep 90, 1 diskette* EPA/SW/DK-93/012
System: IBM PC AT or compatible; Memory: 504MB. Language: FORTRAN.
The software is on one 5 1/4 inch diskette, 1.2M high density. File format: ASCII. Documentation included; may be ordered separately as PB93-134096.

ADL Migration Estimation Model (AMEM) is a user friendly software package programmed for an IBM personal computer that provides the user with the ability to estimate the weight fraction of a chemical migrating from a polymeric material. The chemical may be an additive (e.g., a plasticizer) or unreacted monomer (e.g., styrene). The program estimates the migration of chemicals based on mathematical equations derived using diffusion and mass transfer theories. The user is prompted for chemical specific data such as molecular weight and vapor pressure of the migrant. The user may enter the diffusion coefficient for the polymer of interest or may use one of the default values provided by the software for six generic types of polymers with a wide range of diffusion coefficients. Background information, model development, mathematical calculations, example scenarios, and a user's guide are provided in the documentation.

Keywords: *Software, *Polymers, *Environmental transport, *Indoor air pollution, *Diffusion, Computerized simulation, Diskettes, Plasticizers, Mass transfer, Molecular weight, Additives, Monomers, Vapor pressure, Study estimates, *ADL Migration Estimation Model.

PB93-500742/REB CD-ROM\$45.00
Toxic Release Inventory (TRI), 1987-1990 (on CD-ROM). Data file. Environmental Protection Agency, Washington, DC. Office of Pollution, Prevention, and Toxics. 1990, CD-ROM* EPA/DF/CD-93/020
System: IBM PC or compatible. 640K RAM (with 430-480K RAM available for fielded data), Hard Disk, MS-DOS or PC-DOS version 3.3 or higher, CD-ROM drive, color or monochrome monitor and a printer. Supersedes PB92-500024. See also PB92-501816 (1990), PB91-507509 (1989), PB91-508572 and PB91-509109. Includes user instructions.
The datafile is on one 4.72 inch disc. Data format: ISO 9660. The diskettes are in ASCII format.

Section 313 of the Emergency Planning and Community Right-to-Know Act (also known as Title III) of the Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499) requires EPA to establish a national inventory of toxic chemical emissions from certain facilities. The following information is required: the name, location and type of business; off-site locations to which the facility transfers toxic chemicals in waste; whether the chemical is manufactured (including importation), processed, or otherwise used and the general categories of use of the chemical; an estimate (in ranges) of the maximum amounts of the toxic chemical present at the facility at any time during the preceding year; quantity of the chemical entering each medium - air, land, and water - annually; waste treatment/disposal methods and efficiency of methods for each waste stream; optional information on waste minimization; and a certification by a senior facility official that the report is complete and accurate. The law mandates that the data be made publicly available through a computer database.

Keywords: *Data file, *Toxic substances, *Waste management, *Chemical compounds, Land pollution, Air pollution, Water pollution, Manufacturing, Industrial plants, Emergency plans, Public information, Waste disposal, Waste treatment, Pollution regulations, Requirements, CD-ROM, *TRI (Toxic Release Inventory), Emission inventories.

PB93-502631/REB CP D02
Flexible Membrane Liner Advisory Expert System (FLEX) (for Microcomputers) (Version 3.0). Software. Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab. Sep 92, 1 diskette* EPA/SW/DK-93/029
System: IBM 80386 or compatible; DOS 5.0 operating system, 500K. Language: C.
The software is on one 5 1/4 inch diskette, 1.2M high density. File format: ASCII. Documentation included; may be ordered separately as PB93-134872.

Flexible Membrane Liner Advisory Expert System (FLEX), assists in the interpretation of the data from EPA Method 9090 tests. The U.S. Environmental Protection Agency uses Method 9090 as the standard test for determining the chemical compatibility of flexible membrane liners used in solid waste containment applications. The FLEX system uses artificial intelligence techniques to analyze selected EPA Method 9090 test results. The program's design enables the system to quickly run the 9090 test data through a large number of rules representing conventional linear standards. It then generates a report detailing data omissions, inconsistencies, and any indications that the liner may be unsuitable for containment of the test leachate or a chemically similar substance.

Keywords: *Software, *Expert systems, *Solid waste disposal, *Hazardous materials, *Membranes, *Linings, Diskettes, Performance standards, Land pollution control, Chemical resistance, Leaching, Materials tests, Computability methods, Physical properties, *Flexible Membrane Liner Advisory Expert System, EPA method 9090, Geomembranes, Geosynthetic materials.

PB93-904200/REB Subscription
EPA (Environmental Protection Agency) Publications Bibliography, Quarterly Abstract Bulletin. Quarterly repts. Environmental Protection Agency, Washington, DC. Office of Administration. 1993, 4 issues
Supersedes PB92-904200.
Paper copy available on Subscription, U.S., Canada, and Mexico price \$135.00/year; all others \$270.00. Single copies also available.

EPA Publications Bibliography is a quarterly abstract bulletin containing the abstracts, corporate source, subject, contract number and title indexes. The fourth issue of the year contains bibliographic citations with abstracts for the preceding quarter and cumulative indexes for the calendar year.

Keywords: *Bibliographies, *Air pollution, *Water pollution, Abstracts, Subject indexing, Authors, Technical reports, Regulations, Standards, Waste disposal, Public health, *Environmental protection, Air quality maintenance, Air pollution effects.

PB93-911600/REB Subscription
Pesticide Compact Label File - 1990 Updates. Irregular repts. Environmental Protection Agency, Washington, DC. Office of Pesticide Programs. 1993, open series
Supersedes PB92-911600.
Microfiche available on subscription, U.S., Canada, and Mexico price \$180/year; all others \$360.00. Basic set available as PB92-911699.

Photographs of updated and new pesticide labels plus updated index to the entire Compact Label File. Contains a collection of information on registered pesticide labels. Information includes active ingredients and percentages of same; common name of active chemicals, sites and pests for usage, dosage and safety information. The subscription update service provides current updates to the manual (base set).

Keywords: *Documentation, *Pesticides, Photographs, Microfilm, Labels, Information retrieval, Indexes (Documentation).

PB93-921100/REB Standing Order
Health Effects Assessment Summary Tables. Quarterly. Environmental Protection Agency, Washington, DC. 1993, 4 issues
Supersedes PB92-921100.

Paper copy available on Standing Order, Deposit Account required (Minimum deposit \$100 U.S., Canada, and Mexico; all others \$200). Single copies also available. Issued and superseded quarterly.

The document is an excellent 'pointer' system to identify current literature or changes in assessment criteria for many chemicals of interest to Superfund. It was prepared for Superfund use by the Environmental Criteria and Assessment Office (ECAO-Cin) in EPA's Office of Health and Environmental Assessment. Chemicals considered are those for which Health Effects Assessment Documents, Health and Environmental Effects Profiles, Health Assessment Documents or Air Quality Criteria Documents have been prepared by ECAO. Radionuclides considered are those believed to be most common at Superfund sites. Tables summarize reference doses (RfDs) for toxicity from subchronic and chronic inhalation, oral exposure, slope factors and unit risk values for carcinogenicity based on lifetime inhalation and oral exposure, and radionuclide carcinogenicity.

Keywords: *Public health, *Hazardous materials, *Radioactive wastes, *Chemical compounds, Waste disposal, Exposure, Site surveys, Dosage, Tables (Data), Risks, Reviews, *Superfund program, *Environmental impact assessments, *Biological effects, *Health hazards, Air quality, Environmental effects.

PB93-921700/REB Subscription
Environmental Protection Agency Civil Enforcement Docket. Quarterly rept. Environmental Protection Agency, Washington, DC. Office of Enforcement. M. J. Miller. 1993, open series
Supersedes PB92-921700.
Available on subscription, U.S., Canada, and Mexico price \$240/yr price for others \$480/yr. Individual issues are available at price code E17. This subscription is also available on diskette, order number PB91-591970.

The Enforcement Docket is the U.S. Environmental Protection Agency's system for tracking civil judicial cases filed on the Agency's behalf by the Department of Justice. The Docket contains information on filed civil cases from 1972 to the end of October 1990. The information contained in the Docket can be grouped into case information, facility information and defendant information. Case information contains data on a case such as case name, data filed, date concluded, laws/sections violated, and penalty information. Facility information contains data related to the facility including a complete address and EPA ID number. Finally, there are a list of all the defendants associated with the case.

Keywords: *Law enforcement, Law (Jurisprudence), *US EPA, *Environmental pollution, Case studies, Pollution regulations.

PB93-963251/REB PC A02/MF A01
Mentor-Protege Program. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. Oct 92, 10p EPA/540/R-92/029, OSWER-9242.6-12
Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The document presents the conceptual framework and understanding of the Mentor-Protege Program being introduced and developed within the Environmental Protection Agency (EPA) to stimulate the participation of small disadvantaged businesses in EPA contract requirements.

Keywords: *Contract administration, *Small businesses, Disadvantaged groups, Programs, Contracts, Contractors, Commercial development, *Environmental Protection Agency, Mentor-Protege Program.

PB93-963252/REB PC A03/MF A01
Guidance on Implementation of the Superfund Accelerated Cleanup Model (SACM) under CERCLA and the NCP Directive. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. 7 Jul 92, 12p OSWER-9203.1-03

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Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The directive provides a more precise description of the Superfund Accelerated Cleanup Model (SACM) in order to ensure its consistent application with CERCLA and the NCP.

Keywords: *Superfund, *Waste management, *Hazardous materials, Guidelines, Remedial action, Compliance, Sites, Assessments, Law enforcement, Implementation, *Office of Solid Waste and Emergency Response, *Superfund Accelerated Cleanup Model, National Contingency Plan, Comprehensive Environmental Response Compensation and Liability Act, Cleanup operations.

PB93-963253/REB PC A01/MF A01
Exercising Flexibility through the Superfund Accelerated Cleanup Model (SACM). Directive. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. Oct 92, 3p OSWER-9203.1-03A
See also PB93-963252.

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The directive reaffirms the Office of Solid Waste and Emergency Response's commitment to supporting regional offices in soundly-based decision-making while implementing the Superfund Accelerated Cleanup Model.

Keywords: *Superfund, *Waste management, *Hazardous materials, Remedial action, Regional analysis, Decision making, Implementation, Sites, Management planning, Compliance, *Office of Solid Waste and Emergency Response, *Superfund Accelerated Cleanup Model, National Contingency Plan, Comprehensive Environmental Response Compensation and Liability Act, Cleanup operations, National Priorities List.

PB93-963254/REB PC A03/MF A01
Superfund Progress: Fall/Winter 1992. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. Jan 93, 17p OSWER-9200.1-12-3

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The issue of Superfund Progress provides information on Superfund training programs, promoting local involvement in Superfund, and a Superfund 1992 progress report.

Keywords: *Superfund, *Training devices, *Waste management, *Hazardous materials, *Personnel development, Remedial action, US EPA, Local government, Public opinion, Protective equipment, Law enforcement, Cleanup operations.

PB93-963255/REB PC A03/MF A01
Superfund Progress. Aficionado's Version. Progress as of September 30, 1992. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. Jan 93, 15p OSWER-9200.1-12C

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The issue of Superfund Progress Aficionado's Version provides facts and figures as of September 30, 1992, for NPL site distribution, emergency removals, preliminary assessments/site inspections/the NPL, remedial investigations/feasibility studies/RODs, remedial action, and enforcement.

Keywords: *Superfund, *Waste management, *Hazardous materials, Assessments, US EPA, Remedial action, Sites, Feasibility studies, Inspections, Law enforcement, Emergency planning, *Office of Solid Waste and Emergency Response, National Priorities List, Record of Decision.

PB93-963256/REB PC A02/MF A01
Superfund Records of Decision Update. Volume 7, Number 2, November 1992. Intermittent bulletin. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. Nov 92, 10p OSWER-9200.5-2161-VOL-7-NO-2

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The issue of the ROD Update provides a list of RODs signed in FY 1992. The list was developed from the following sources: (1) CERCLIS download (October 1992); (2) NPL Site Descriptions; and (3) Regional Coordinators. The list and descriptive information are preliminary only. The Superfund national ROD total for FY 1992 is 164 RODs.

Keywords: *Superfund, *Waste management, *Hazardous materials, *Remedial action, Listings, Sites, Pollutants, *Record of Decision, EPA regions 1-10, National Priorities List, Regional coordinators.

PB93-963261/REB PC A03/MF A01
Highlights: Superfund Program Management. Fiscal Year 1993. Directive. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. Oct 92, 37p OSWER-9200.3-01H-3

Paper copy available on Standing Order, deposit account required (minimum deposit \$200 U.S., Canada, and Mexico; all others \$400). Single copies also available in paper copy or microfiche.

The manual is targeted to EPA Superfund Division Directors. It is intended to provide an overview of Fiscal Year 1993 Superfund program goals and management initiatives. Specifically the document contains information on strategic planning goals and themes, program planning and budgeting, and manager's schedule of significant events.

Keywords: *Hazardous materials, *Project management, Management planning, Budgeting, Financial management, Decision making, Sites, Models, Performance evaluation, Cleanup, *Superfund, Waste management.

PB93-963801/REB PC A04/MF A01
Superfund Record of Decision (EPA Region 2): Ramapo Landfill Site, Rockland County, NY. (First Remedial Action), March 1992. Final rept. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. 31 Mar 92, 70p EPA/ROD/R02-92/169

Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 60-acre former landfill site is located on a 96-acre tract in the Town of Ramapo, Rockland County, New York, about 35 miles northwest of New York City. Utility corridors lie on three sides of the site, including high-voltage power transmission lines. The site is currently being used as a compaction and transfer facility by the Town of Ramapo. Trash and debris are weighed at a weigh station/guardhouse, compacted at a baler facility in the northeastern corner of the site, and transferred to the Al Turi Landfill in Goshen, New York. The ROD represents the entire remedial action for the site by controlling source of contamination and the generation of leachate, and treatment of contaminated ground water. The primary contaminants of concern affecting soil, ground water, and surface water are VOCs, including benzene; other organics; and metals, including arsenic, chromium, and lead. The selected remedial action for the site is included.

Keywords: *Superfund, *Hazardous materials, *Remedial action, *Waste disposal, *Waste treatment, Earth fills, Water pollution, Surface waters, Ground water, Soil contamination, Volatile organic compounds, Metals, Organic compounds, *Record of Decision, First remedial action-Final, EPA region 2, Cleanup, Rockland County(New York).

PB93-963901/REB PC A04/MF A01
Superfund Record of Decision (EPA Region 3): U.S. Defense General Supply Center, (Operable Unit 5), Richmond, VA. (First Remedial Action), March 1992. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. 25 Mar 92, 70p EPA/ROD/R03-92/142

Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 640-acre U.S. Defense General Supply Center (DGSC) is a military support, service, and storage facility located approximately 11 miles south of the City of Richmond, Virginia. Land use in the area is predominantly light industrial and residential with surrounding woodlands. Studies conducted by the Army in 1984 led to initiating site clean-up activities. Results of remedial investigations revealed VOCs, other organics, and metal contamination in soil and ground water samples at sites throughout the facility. The ROD addresses the interim remediation of contaminated soil surrounding the ANP as OU5. The future ROD will address the remediation of ground water associated with the acid neutralization pits. Other RODs will address remediation activities for the remaining contamination areas at the site. The primary contaminants affecting the soil are VOCs including PCE, TCE, benzene, toluene, and xylenes; other organics, including pesticides and solvents; and arsenic. The selected remedial action for the site is included.

Keywords: *Superfund, *Remedial action, *Hazardous materials, *Waste disposal, *Waste treatment, Military facilities, Soil contamination, Land pollution, Ground water, Water pollution, Volatile organic compounds, Organic compounds, Metals, *Record of Decision, First remedial action-Interim, EPA region 3, Cleanup, Richmond(Virginia).

PB93-963902/REB PC A07/MF A02
Superfund Record of Decision (EPA Region 3): Raymark Site, Operable Unit 1, Montgomery County, PA. (First Remedial Action), December 1991. Final rept. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. 30 Dec 91, 138p EPA/ROD/R03-92/144

Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 7-acre Raymark site is an active metal manufacturing and electroplating plant in the Borough of Hatboro, Montgomery County, Pennsylvania. The site, located in an industrial area, is approximately 100 feet from the nearest residence. The nearest surface water is Pennypack Creek, which flows 4,000 feet southwest of the site. As part of the rivet manufacturing processes at the plant, VOCs, including 30 to 40 gallons of TCE, were used daily at the site to clean and degrease metal parts. The ROD addresses the soil/source of contamination as the final action at the site and is referred to as OU1. The drinking water and risks posed by groundwater (OU2 and OU3, respectively) were addressed in a previous 1990 ROD. The primary contaminants of concern affecting the soil/source are VOCs, including 1,2-DCE, PCE, and TCE. The selected remedial action for the site is included.

Keywords: *Superfund, *Hazardous materials, *Industrial waste treatment, Volatile organic compounds, Soil contamination, Metal industry, Electroplating, Land pollution, *Record of Decision, Cleanup, First remedial action-Final, EPA region 3, Montgomery County(Pennsylvania).

PB93-963903/REB PC A06/MF A02
Superfund Record of Decision (EPA Region 3): Dublin Water Supply, Bucks County, PA. (First Remedial Action), December 1991. Final rept. Environmental Protection Agency, Washington, DC. Office of Emergency and Remedial Response. 30 Dec 91, 124p EPA/ROD/R03-92/145

Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200

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U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 4.5-acre Dublin Water Supply is a former manufacturing facility located in Dublin Borough, Bucks County, Pennsylvania. The site consists of a one-story tower building and parking lot. The surrounding area is mixed commercial and residential, with a fruit orchard bordering the site to the north and west. Groundwater beneath the site contributes to the aquifer by providing a drinking water source to area residents. In 1986, the current owner purchased the site for antique car restoration. A portion of the site is currently leased to Laboratory Testing, Inc., for metallurgical testing. During a routine drinking water survey in 1986, the state discovered elevated levels of TCE affecting approximately 170 area homes. The early action ROD addresses the provision of a permanent clean drinking water supply to affected area residents and businesses. An additional RI/FS, which commenced in 1991, will focus on remediation of the soil, ground water, and surface water in a separate clean-up action. The primary contaminants of concern affecting ground water are VOCs, including TCE, PCE, and vinyl chloride. The selected remedial action for the site is included.

Keywords: *Superfund, *Remedial action, *Hazardous materials, *Waste disposal, Ground water, Water pollution control, Potable water, Volatile organic compounds, Feasibility studies, Water supply, Filtration, *Record of Decision, First remedial action-Final, Bucks County(Pennsylvania), EPA region 3, Cleanup.

BP93-963904/REB **PC A05/MF A01**
Superfund Record of Decision (EPA Region 3):
MW Manufacturing Site, Montour County, PA.
(Subsequent Remedial Action), June 1992. Final
rept.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
30 Jun 92, 90p EPA/ROD/R03-92/153
Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 15-acre MW Manufacturing Site is a former copper recovery facility in Montour County, Pennsylvania. Land use in the area is mixed farmland and residential with a wetlands area, Mauses Creek, located 700 feet west of the site. The estimated 5,200 people who reside within 1/4 mile of the site use private ground water wells as their drinking water source. In 1982, the state performed an initial remedial investigation that revealed several areas posing potential threats to public health: the carbon waste pile; four wire-fluff waste piles; a surface impoundment; a buried lagoon; and contaminated soil, drums, and storage tanks. Based on the investigation, the site has been divided into three OUs to address cleanup of all contaminated media. The ROD (OU3) addresses the contamination of the groundwater and the adjacent wetland areas as the final remedial action at the site. The primary contaminants of concern affecting the ground water are VOCs, including PCE and TCE; and other organics, including halogenated aliphatics. The selected remedial action for the site is included.

Keywords: *Superfund, *Remedial action, *Hazardous materials, *Waste disposal, Water pollution, Ground water, Volatile organic compounds, Organic compounds, Storage tanks, Lead(Metals), Copper, Materials recovery, Public health, Soil contamination, Surface impoundments, *Record of Decision, Montour County(Pennsylvania), Subsequent remedial action-Final, Cleanup, EPA region 3.

BP93-964101/REB **PC A03/MF A01**
Superfund Record of Decision (EPA Region 5):
Grand Traverse Overall Supply Site, Greilickville,
MI. (First Remedial Action), February 1992. Final
rept.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
3 Feb 92, 36p EPA/ROD/R05-92/195
Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 3.9-acre Grand Traverse Overall Supply (GTOS) site is an active commercial laundering facility in Greil-

lickville, Leelanau County, Michigan. Land use in the area is residential, with an elementary school directly east of the site. From 1953 to 1977, the GTOS facility discharged laundry and process wastes from dry cleaning operations onsite to seepage lagoons and a dry-well. From 1978 to 1980, the state required GTOS to conduct removal actions. In 1978, dry cleaning operations were discontinued, but the GTOS site remains active and continues to discharge wastes into the sanitary sewer system. The ROD addresses the potential risks posed by onsite ground water. As a result of previous removal actions, organic compounds present in low levels in soil, and organic and inorganic compounds present in ground water no longer pose an unacceptable risk to human health or the environment; therefore, there are no contaminants of concern affecting the site. The selected remedial action for the site is the no action alternative; however, ground water monitoring for inorganics will continue for 1 year.

Keywords: *Superfund, *Hazardous materials, *Waste disposal, *Remedial action, Dry cleaning, Washing, Laundries, Compliance, Water pollution control, *Record of Decision, EPA region 5, Cleanup, First remedial action-Final, Leelanau County(Michigan).

BP93-964102/REB **PC A05/MF A01**
Superfund Record of Decision (EPA Region 5):
Midco II, Gary, IN. (First Remedial Action),
(Amendment), April 1992.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
13 Apr 92, 76p EPA/ROD/R05-92/193
Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 7-acre Midco II site is an abandoned chemical waste storage and disposal facility in Gary, Indiana. Land use in the surrounding area is predominantly industrial. The underlying aquifer, which is used primarily for non-drinking purposes, is highly susceptible to contamination from surface sources. From 1976 to 1978, the site was used for treatment, storage, and disposal of chemical and bulk liquid wastes. The ROD amends a 1989 ROD that addressed the remaining contaminated soil, pit wastes, and ground water by treatment of an estimated 35,000 cubic yards of soil wastes. The amended remedy reduces the estimated amount of soil to be treated, as a result of new information on arsenic data and amended soil CALs, further defines the site cover requirements, and further defines the requirements for deep well injection of contaminated ground water. The primary contaminants of concern affecting the subsurface soil, sediment, and ground water are VOCs, including methylene chloride, benzene, toluene, TCE, and xylenes; other organics, including PCBs, phenols, and PAHs; and metals, including chromium, and lead. The amended remedial action for the ROD is included.

Keywords: *Superfund, *Remedial action, *Hazardous materials, *Waste disposal, Abandoned sites, Volatile organic compounds, Land pollution, Water pollution, Sediments, Ground water, Soil contamination, Organic compounds, Metals, *Record of Decision, Gary(Indiana), First remedial action-Amendment, EPA region 5, Cleanup.

BP93-964103/REB **PC A04/MF A01**
Superfund Record of Decision (EPA Region 5):
Twin Cities AF Reserve (SAR Landfill), MN. (First
Remedial Action), March 1992. Final rept.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
31 Mar 92, 58p EPA/ROD/R05-92/192
Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 2-acre Twin Cities AF Reserve (SAR Landfill) site is a former disposal area for U.S. Air Force (USAF) main Base refuse in Minneapolis, Hennepin County, Minnesota. Land use in the area consists of a Small Arms Range, Minneapolis-St. Paul International Airport, and Fort Snelling State Park. The Small Arms Range Landfill (SARL), acquired by the USAF in 1955, was used for disposal of main Base refuse from 1963 to 1972. Industrial wastes were buried at the landfill. The ROD is the first and final action for the site and ad-

resses remediation of the ground water. The primary contaminants of concern affecting the soil and surface water did not exceed ARARs and, therefore, are not considered a threat since access restrictions addressed in the ROD will be implemented at the site. The primary contaminants of concern affecting the ground water are VOCs, including benzene, 2-butanone, toluene, and TCE; other organics, including di-n-butylphthalate; and metals, including arsenic, beryllium, cadmium, and chromium. The selected remedial action for the site is included.

Keywords: *Superfund, *Hazardous materials, *Waste disposal, *Remedial action, Water pollution, Ground water, Volatile organic compounds, Organic compounds, Metals, Earth fills, Military facilities, Industrial wastes, *Record of Decision, Hennepin County(Minnesota), Cleanup, First remedial action-Final, EPA region 5.

BP93-964104/REB **PC A03/MF A01**
Superfund Record of Decision (EPA Region 5):
Columbus Old Municipal Landfill, Columbus, IN.
(First Remedial Action), March 1992. Final rept.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
31 Mar 92, 36p EPA/ROD/R05-92/194
Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 19-acre Old Municipal Landfill site is located near the City of Columbus in Bartholomew County, Indiana. The site, located in the 100-year floodplain of the East Fork of the White River, is bounded by farmland, state roads, and an inactive gravel quarry pond. Current land use in the vicinity of the site includes an abandoned shooting range, concrete mixing operation, and the City of Columbus POTW. The waste material was dumped directly on the ground surface and was exposed to the elements. Open burning of waste material occurred regularly. Annual spring flooding caused the waste material to become submerged periodically. In 1990, the PRPs, under direct guidance of the state and EPA, conducted an investigation to assess the potential impacts of the waste material deposited in the landfill on soil, ground water, surface water, and river sediments in the vicinity of the site. Based upon findings of the remedial investigation and evaluation of current site risks, EPA concluded that the site currently poses no immediate or long-term risks to human health and the environment. The conclusion is based on current site conditions with the assumption that these conditions will not change. The selected remedial action for the site is no further action (modified), which includes ground water monitoring and a five-year review of site conditions to evaluate the protectiveness of the remedy.

Keywords: *Superfund, *Waste disposal, *Remedial action, *Hazardous materials, Earth fills, Soil contamination, Land pollution control, Water pollution control, Ground water, Surface waters, Flood plains, Runoff, *Record of Decision, Cleanup, EPA region 5, First remedial action-Final, Bartholomew County(Indiana).

BP93-964501/REB **PC A05/MF A01**
Superfund Record of Decision (EPA Region 9):
Westinghouse Electric (Sunnyvale Plant), Sunny-
vale, CA. (First Remedial Action), October 1991.
Final rept.
Environmental Protection Agency, Washington, DC.
Office of Emergency and Remedial Response.
16 Oct 91, 82p EPA/ROD/R09-92/079
Available on Standing Order, deposit account required for all RODS is \$700 for U.S., Canada, and Mexico; all others \$1,400. Deposit required for each region, \$200 U.S., Canada, and Mexico; all others \$400. Also available individually in paper copy or microfiche.

The 75-acre Westinghouse Electric (Sunnyvale Plant) site is an active industrial facility located in Sunnyvale, Santa Clara Valley, California. The site currently manufactures steam generators, marine propulsion systems, and missile-launching systems for the U.S. Government. The area around the site has been developed for light industrial, commercial, and residential uses. The ROD addresses remediation of the contaminated shallow ground water and soil, which pose the primary risks at the site. The primary contaminants of concern affecting soil and ground water are PCBs, sol-

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vents, and fuel compounds. The selected remedial action for the site is included.

Keywords: *Superfund, *Remedial action, *Hazardous materials, *Waste disposal, Soil contamination, Land pollution, Water pollution, Ground water, Volatile organic compounds, Polychlorinated biphenyls, Industrial wastes, Propulsion, Underground storage, Storage tanks, Fuels, *Record of Decision, Cleanup, EPA region 9, Santa Clara (California), First remedial action-Final.

AD-A258 623/8/REB PC A11/MF A03
Molecular Regulation of the Induction of Cytochrome P-450E in the Estuarine Fish *Fundulus heteroclitus*. Doctoral thesis.
Woods Hole Oceanographic Institution, MA.
P. J. Kloepper-Sams. Feb 89, 226p Rept no. WHOI-89-1
Contracts EPA-CR-813155-01-0, EPA-CX-813567-01-01
Sponsored in part by grants NSF-OCE83-10505 and PHS-ES-4220.

Regulation of induction of P450IA1 (P-450E) in teleosts was examined by investigating temporal relationships between P450E protein, activity, and mRNA levels, and measuring protein and heme turnover, in the teleost *Fundulus heteroclitus*. Monoclonal antibodies used for P450E protein detection were specific in immunoblots for purified scup (*Stenotomus chrysops*) P450E, a single band corresponding to P450E in scup microsomal mixtures, and the xenobiotic-inducible orthologue in other fish including *Fundulus*. P450E mRNA was measured by translation of total RNA, precipitation with anti-P450E polyclonal antibodies and autoradiography, or by hybridization of RNA with a trout P450IA1 cDNA. P450E and ethoxyresorufin O-deethylase activity rose coordinately after treatment with Beta-naphthoflavone, lagging behind mRNA increases by about 25 hours. mRNA levels declined rapidly, despite prolonged elevated protein and activity levels. In a dual label experiment, P450E was precipitated from solubilized microsomes. The apoprotein was calculated to have a half-life of 32 to 43 hours, the heme moiety a longer half-life of 104 hours. These results support a hypothesis that transcriptional enhancement is involved in initial stages of P450E induction, while other forms of control are important in maintenance of P-450E expression. This study addressed a specific chemico-biological interaction-- the organism's biochemical response to a challenge by foreign compounds--which occurs in the marine environment. Xenobiotic metabolism, Enzyme induction, Cytochrome P-450.

Keywords: Augmentation, Autoradiography, Control, Detection, Environments, Enzymes, *Fishes, Half life, Hemoglobin, Hybridization, Interactions, Labels, Maintenance, Metabolism, Microsomes, Mixtures, Monoclonal antibodies, Precipitation, Proteins, Regulations,

Response, Trout, Estuarine fish, **Fundulus heteroclitus*, *Cytochrome P-450, Theses, Enzyme induction, Messenger RNA.

DE92643948/REB PC A04/MF A01
Radioecology in Nordic limnic systems - present knowledge and future prospects.
National Environmental Protection Agency, Solna (Sweden).
1991, 64p SNV-3949

This report was compiled during a meeting within the aquatic group in the Nordic Nuclear Safety Research Programme, in November 1990. It is a joint effort to summarize the results from post-Chernobyl research in Nordic limnic ecosystems. The most important pathways, processes and factors determining the (sup 137)CS concentration in fish are identified and discussed. (au). (Atomindex citation 23:071064)

Keywords: *Aquatic Ecosystems, *Cesium 137, B Codes, Biological Half-Life, *Chernobylsk-4 Reactor, Ecological Concentration, Environmental Exposure Pathway, Experimental Data, Fallout Deposits, Fishes, International Cooperation, Lakes, Radioactivity, *Radioecology, Radionuclide Migration, Reactor Accidents, Sediments, Tables(data), *Foreign technology, EDB/540330, EDB/220502, *Meetings.

DE93603681/REB PC A03/MF A01
Bladder-wrack (*Fucus vesiculosus* L.) as an indicator for radionuclides in the environment of Swedish nuclear power plants.
National Environmental Protection Agency, Solna (Sweden).
G. Neumann, and M. Notter. 1991, 38p SNV-3931

Results from gamma radiation analysis of samples of bladder-wrack, *Fucus vesiculosus*, growing in the aquatic environment of Swedish nuclear power plants, are presented. The concentrations of the main nuclides, viz. (sup 60)Co, (sup 58)Cu, (sup 65)Zn, (sup 54)Mn and (sup 110)Ag, are reported. Series of samples from the environment of Ringhals (at the Swedish west coast) and of Simpevarp (at the Baltic proper) were collected during the years 1979-1982 and 1981-1982, respectively. The data for (sup 60)Co and (sup 65)Zn were analysed using a model correlating the concentration of radionuclides in *Fucus* with the corresponding discharges. Also, on a small series of (sup 60)Co data from Simpevarp, a model was tried based on kinetic constants for uptake and elimination. The nuclide concentrations in *Fucus* as a function of the distance to the point of emission was also studied, as well as transfer factors for the different nuclides. Finally the accuracy which can be expected when using *Fucus* for checking discharges of radionuclides from a power plant is discussed. 15 refs., 6 figs., 11 tabs. (Atomindex citation 23:078837)

Keywords: *Fucus, Baltic Sea, *Biological Indicators, Cobalt 60, North Sea, Power Reactors, *Radioecological Concentration, Radionuclide Kinetics, Statistical Data, Sweden, Zinc 65, Tables(data), *Foreign technology, EDB/220502, EDB/560162, *Nuclear power plants.

DE93721673/REB PC A03/MF A01
New technology for refrigeration and heating plants.
National Environmental Protection Agency, Solna (Sweden).
U. Joensson, P. Stenberg, A. H. Pettersson, and P. O. Rizell. Mar 92, 48p SNV-4033
Also available in Swedish as SNV-4020.

The report is an account of a project which aimed at making a survey of the technical development of refrigeration and heating pump plants against the background of international and national plans to phase out the use of CFC and HCFC refrigerants. The report is not intended to give full coverage of the market; instead, its purpose is to give examples of technology which allow for reductions in the use of CFC and HCFC refrigerants. The account describes the technical development position in the autumn of 1991. The consultancy is responsible for the contents of the report. (au).

Keywords: *Refrigeration, *Air Pollution Abatement, Chlorofluorocarbons, *Heat Pumps, Industry, Research Programs, Surveys, Sweden, Technology Assessment, *Foreign technology, EDB/290300, EDB/540120.

DE93721674/REB PC A07/MF A02
Greenhouse gases. Emissions and countermeasures in an international perspective.
National Environmental Protection Agency, Solna (Sweden).
Dec 91, 150p SNV-4045
Also available in Swedish as SNV-4011.

This report to the Swedish government aims at describing the factual basis of the greenhouse gas problem. Methods to account for the greenhouse gas emissions are treated, including the possibility to smooth out randomized yearly fluctuations in air temperature and precipitation. The 1990 emission of greenhouse gases are illustrated and forecasting has been done to AD 2000. (22 figs.).

Keywords: *Greenhouse Gases, Agriculture, *Air Pollution, Carbon Dioxide, Chlorofluorocarbons, Climatic Change, Emission, Environmental Effects, Environmental Policy, Forecasting, Forestry, Greenhouse Effect, Methane, Nitrous Oxide, Ozone, Statistical Data, Sweden, Taxes, Tables(data), *Foreign technology, EDB/540120.

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Bladder-wrack (*Fucus vesiculosus* L.) as an indicator for radionuclides in the environment of Swedish nuclear power plants. DE93603681/REB PC A03/MF A01

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Conversion of Methanol-Fueled 16-Valve, 4-Cylinder Engine to Operation on Gaseous 2H₂/CO Fuel. Interim Report 4. PB93-144376/REB PC A03/MF A01

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Index entries in this section are selected to indicate important ideas and concepts presented in a report. When using the keyword index, be sure to look under terms narrower, broader, or related to a particular topic. Although some of the keywords are not selected from a controlled vocabulary of terms, most of them have been selected from the DoD, DoE, NASA, or NTIS controlled vocabularies. The entries are arranged by keyword and then by the NTIS order number.

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Use: Keywords Term	GLOBAL ASPECTS
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