

ATSDR

AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

**FY 1995 Agency Profile and Annual Report
October 1, 1994, to September 30, 1995**



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service



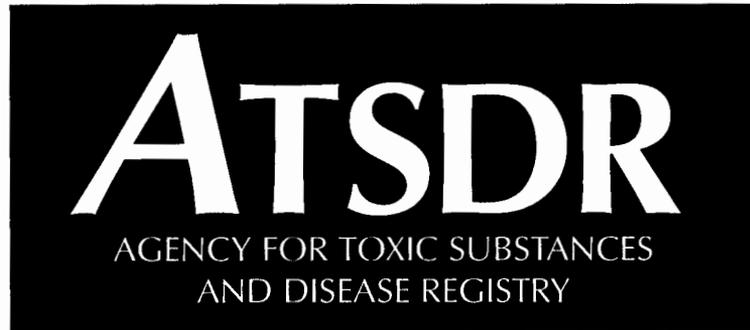
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Table of Contents

Foreword	i
Executive Summary	iii
Statement of Values	v
ATSDR Vision, Mission, and Goals	vii
Chronology of Statutory Authorities	ix
Agency Profile	xi
Overview of ATSDR	xi
Agency Mission	xi
Range of Agency Activities	xii
Organizational Structure	xiv
ATSDR Budget and Appropriations History	xvi
Cost Recovery	xvii
Chapter 1: Division of Health Assessment and Consultation	1
Public Health Assessments	2
Petitions for Health Assessment	5
Public Health Assessment Enhancement Initiative	7
Community Outreach	10
Cooperative Agreement Program	12
Public Health Advisories	14
Health Consultations	15
Demographic Analysis	19
Exposure Investigations	19

Chapter 2: Division of Toxicology	23
Identification and Ranking of Hazardous Substances	23
Preparation of Toxicological Profiles	23
Minimal Risk Levels	25
Identification of Priority Data Needs	26
Implementation of a Substance-Specific Applied Research Program	27
National Toxicology Program	30
Great Lakes Human Health Effects Research Program	30
Chemical-Specific Health Consultations	32
Emergency Response	33
Chapter 3: Division of Health Studies	37
Evaluating the Relationship Between Exposure and Adverse Health Effects	37
Summary of FY 1995 Health Study Findings by Priority Health Condition	38
National Exposure Registry	46
Surveillance	49
Chapter 4: Division of Health Education	53
Summary of Site-Specific Activities	53
Building Partnerships and Capacity To Communicate Environmental Health Messages	56
Increasing Access to Information	63
Special Initiatives	65
Chapter 5: Office of the Assistant Administrator	67
Public Health Practice Coordination Group	67
Office of the Associate Administrator for Science	72
Office of Federal Programs	74
ATSDR Washington Office	75
Office of Policy and External Affairs	76
Office of Regional Operations	78
Office of Program Operations and Management	81



FY 1995 Agency Profile and Annual Report

October 1, 1994, to September 30, 1995

Disclaimer

The mention of a company name or product in this annual report is for identification only and does not constitute endorsement by the Agency for Toxic Substances and Disease Registry (ATSDR). Information in this report is intended primarily for internal administrative use by the agency. This report will be used to help prepare the *ATSDR Biennial Report* to Congress and the Environmental Protection Agency, which is required by Section 104(i)(10) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986.

Appendices

Appendix A:	FY 1995 Completed Public Health Assessments and Public Health Advisories by State	83
Appendix B:	List and Status of Toxicological Profiles	85
Appendix C:	Minority Health Professions Foundation Institutions and Their Respective Studies	89
Appendix D:	ATSDR/MHPF Substance-Specific Applied Research Program Submitted Abstracts and Manuscripts	91
Appendix E:	Institutions Receiving Awards for Great Lakes Research and Their Respective Studies	93
Appendix F:	FY 1995 Acute Release Summary	95
Appendix G:	Glossary of Terms	97
Appendix H:	ATSDR Health Studies Nearing Completion or in Progress	105
Appendix I:	FY 1995 Community Health Education Sites by State or Tribe	113
Appendix J:	Board of Scientific Counselors	117
Appendix K:	Federal Facilities Included on or Proposed for the National Priorities List	119
Appendix L:	ATSDR Regions	127
Appendix M:	Superfund-Supported Publications	129
Appendix N:	Superfund-Supported Presentations	135
Index		143



Foreword

The Agency for Toxic Substances and Disease Registry (ATSDR) is pleased to present this report, which builds upon those of previous years, of the agency's principal works and findings from fiscal year (FY) 1995. Taken collectively, ATSDR's annual reports provide a historical record of significant accomplishments under the Comprehensive Environmental Response, Compensation, and Liability Act (also known as the Superfund statute), as amended, and other federal statutes.

This annual report highlights the accomplishments of FY 1995 in sufficient detail for the reader to appreciate the wide breadth of ATSDR's programs and the advances in public health that occurred during the year.

The employees of the agency take great pride in its accomplishments and the contributions made in 1995 toward improving public health and environmental protection. Comments from interested readers are always welcome.

David Satcher, MD, PhD
Administrator

**ATSDR FY 1995
Annual Report
ii**



Executive Summary

The Agency for Toxic Substances and Disease Registry (ATSDR) is pleased to share with the public its fiscal year (FY) 1995 accomplishments and key activities. The agency prepares an annual report as a record of its public health work in support of various federal environmental statutes. The primary statute governing ATSDR's health mission is the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (also called the Superfund statute).

FY 1995 was significant for ATSDR in its delivery of public health services and advancement of science. The following summarized accomplishments are spelled out in detail elsewhere in this report:

- Blood lead surveillance of children in Kellogg, Idaho, conducted in association with state and district health departments, indicated a continued reduction in exposure to lead.
- An ATSDR-funded clinic provided health services to residents of the Del Amo, California, community exposed to DDT and dioxin.
- Through ATSDR, state, and local health department efforts, residents of a low-income community in Oakland, California, were assessed for lead exposure.
- Findings from ATSDR's Great Lakes Human Health Research Program showed that Native Americans and the urban poor who consume large amounts of fish contaminated with toxic substances have elevated exposure to methyl mercury, PCBs, DDT, and DDE.
- ATSDR provided significant leadership in environmental justice efforts, particularly, support for the Mississippi Delta Project: Health and Environment.
- ATSDR and cosponsors convened the second International Congress on Hazardous Waste: Impact on Human and Ecological Health, which was attended by more than 600 environmental health professionals from 26 nations.
- The agency increased its educational programs for physicians and residents in Superfund communities.
- Studies in several states on the relationship between lead levels in soil and the biological uptake of lead by young children were completed.

- ATSDR analyzed the demographics of persons residing near Superfund sites and reported that minority groups were disproportionately represented.
- Administrative changes were made in how public health assessments are conducted, particularly, earlier involvement with EPA on site-specific activities and increased exposure assessment.
- ATSDR provided new testimony to Congress on the nature and extent of the human health impact of Superfund sites.
- The first national workshop on the psychological effects of environmental hazards on exposed communities was convened by ATSDR.
- The agency released 15 new toxicological profiles and 6 updated profiles; 11 new profiles and 8 updated profiles were released for public comment.
- Agency staff members traveled five times to the scene of a chemical emergency to provide technical assistance related to the release of hazardous substances and responded to 59 requests for information related to acute exposures to environmental toxicants.
- Health reports from individuals in ATSDR's exposure registries for trichloroethylene, benzene, trichloroethane, and dioxins were updated.

Agency staff members are indebted to the U.S. Environmental Protection Agency, state health departments, and local health agencies for their assistance and cooperation during FY 1995.

Barry L. Johnson, Ph.D.
Assistant Surgeon General
Assistant Administrator



Statement of Values

ATSDR's Highest Priority Is Protection of Public Health

In meeting its priority to protect public health, the agency and its employees commit to the following values:

- We will act at all times in the best interests of the public's health.
- We will treat the public respectfully and courteously and will respond promptly to requests with accurate, up-to-date information.
- We will treat each other courteously and respectfully.
- We will meet high performance standards, produce quality work, and seek innovative means of accomplishing our work.
- We will base hiring and promotions on job-related qualifications; the agency is committed to equal employment opportunity.
- We will promote employees' career development through education, training, and quality work experiences.
- We will follow the Department of Health and Human Services' Standards of Conduct for all employees.



Vision, Mission, and Goals

ATSDR Vision

Healthy People in a Healthy Environment

Mission Statement

The mission of the Agency for Toxic Substances and Disease Registry is to prevent exposure and adverse human health effects and diminished quality of life associated with exposure to hazardous substances from waste sites, unplanned releases, and other sources of pollution present in the environment.

Goals

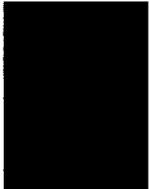
- I. Identify people at health risk because of their exposure to hazardous substances in the environment.
- II. Evaluate relationships between hazardous substances in the environment and adverse human health outcomes.
- III. Intervene to eliminate exposures of health concern and prevent or mitigate adverse human health outcomes related to hazardous substances in the environment.



Chronology of Statutory Authorities

- 1980** The *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980* established **ATSDR** as an agency of the Public Health Service with mandates to 1) establish a National Exposure and Disease Registry; 2) create an inventory of health information on hazardous substances; 3) create a list of closed and restricted-access sites; 4) provide medical assistance during hazardous substance emergencies; and 5) determine the relationship between hazardous substance exposure and illness.
- 1984** The *Resource Conservation and Recovery Act (RCRA), as amended in 1984*, mandated that **ATSDR** work with the Environmental Protection Agency (EPA) to 1) identify new hazardous wastes to be regulated; 2) conduct health assessments at RCRA sites at EPA's request; and 3) consider petitions for health assessments by the public or states.
- 1986** The *Superfund Amendments and Reauthorization Act (SARA) of 1986* broadened **ATSDR's** responsibilities in the areas of public health assessments, establishment and maintenance of toxicologic databases, information dissemination, and medical education.
- 1988** The *Medical Waste Tracking Act of 1988* required **ATSDR** to prepare a report on the health effects of medical waste and mandated that the report be submitted to Congress by November 1, 1990.
- 1990** The *Great Lakes Critical Programs Act of 1990* required EPA, in cooperation with **ATSDR**, to report to Congress on the adverse health effects of water pollutants on people, fish, shellfish, and wildlife.
- 1990** The *Clean Air Act of 1990* designated **ATSDR** as one of eight members of a task force to coordinate research on methods to identify and assess the risks to human health from exposure to air pollutants.
- 1992** The *Housing and Community Development (Lead Abatement) Act of 1992* mandated that EPA, in conjunction with **ATSDR** and the Secretary of Housing and Urban Development, sponsor public education and outreach activities to increase public awareness of the scope and severity of lead poisoning from household sources.

**ATSDR FY 1995
Annual Report
x**



Agency Profile

Overview of ATSDR

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal agency created in 1980 by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or what is more commonly known as Superfund legislation. Congress enacted Superfund as part of its response to two highly publicized and catastrophic events: discovery of the Love Canal hazardous waste site in Niagara Falls, New York, and an industrial fire in Elizabethtown, New Jersey, which set off the release of highly toxic fumes into the air in a densely populated area. Congress also created ATSDR to implement the health-related sections of laws that protect the public from hazardous wastes and environmental spills of hazardous substances.

In 1983, the Secretary of the Department of Health and Human Services (DHHS) by administrative order established ATSDR as a separate agency of the Public Health Service (PHS). In 1984, amendments to the Resource Conservation and Recovery Act (RCRA) authorized ATSDR to conduct public health assessments at RCRA sites when requested by the Environmental Protection Agency (EPA), states, or individuals, and to help EPA decide which substances should be regulated and at what levels those substances threaten human health.

In June 1985, ATSDR was formally organized to begin—in concert with EPA, the Centers for Disease Control (CDC, now the Centers for Disease Control and Prevention), and the National Institute of Environmental Health Sciences (NIEHS)—to address CERCLA, one of the most challenging and innovative environmental laws relating to public health.

Following the reauthorization of Superfund in 1986 under the Superfund Amendments and Reauthorization Act (SARA), the agency received major new mandates. SARA broadened ATSDR's responsibilities in the areas of public health assessments, establishment and maintenance of toxicologic databases, information dissemination, and medical education; new groups within ATSDR were organized to carry out the new tasks. By August 1989, the agency had assumed its current structure.

Agency Mission

The mission of ATSDR is to prevent exposure and adverse human health effects and diminished quality of life associated with exposure to hazardous substances from waste sites, unplanned releases, and other sources of pollution present in the environment. ATSDR works closely with state, local, and other federal agencies to reduce or eliminate illness, disability, and death that result from exposure of the public and workers to toxic substances at waste disposal and spill sites.

As the lead agency within PHS responsible for implementing the health-related provisions of CERCLA, ATSDR is charged with assessing the presence and nature of health hazards at specific Superfund sites, helping to prevent or reduce further exposure and the illnesses that result, and expanding what is known about the health effects of exposure to hazardous substances.

Range of Agency Activities

Following is a summary of the activities assigned to ATSDR in 1980 under the original Superfund statute:

- Determine the extent of danger to public health from a release or threatened release of a hazardous substance. (This mandate covers the range of public health assessment and other support activities provided to EPA, states, and other federal agencies at emergency, immediate-removal, and remedial Superfund sites.)
- Conduct periodic surveys and screening programs to determine the relationships between exposure to hazardous substances and illness. (This mandate includes in vivo and in vitro toxicologic testing, human epidemiologic studies, and establishment of surveillance systems.)
- Establish and maintain a registry of serious diseases and illnesses and registries of all persons environmentally exposed to hazardous substances whenever inclusion of such persons in registries would be scientifically appropriate or valuable for long-term followup or specific scientific studies.
- Establish and maintain a comprehensive and publicly accessible inventory of literature on the health effects of hazardous substances.
- When public health emergencies are caused or are believed to be caused by exposure to hazardous substances, assist, consult, and coordinate with private or public health care providers in providing medical care and testing exposed individuals, including collecting and analyzing laboratory specimens as may be indicated by specific exposures.
- Establish and maintain a complete list of areas closed to the public or otherwise restricted in use because of hazardous substance contamination.

Additional Responsibilities Under SARA

The Superfund Amendments and Reauthorization Act of 1986 greatly expanded the health-related responsibilities of ATSDR and added these additional responsibilities:

- **Toxicologic information and data gaps research:** Create priority lists of hazardous substances by certain time frames; publish toxicological profiles on these substances by certain time frames; and ensure startup of a substance-specific research program to locate information on key health effects.
- **Site-specific health concerns:** Provide consultations to EPA, state, and local officials; conduct public health assessments of all National Priorities List

(NPL) sites by specified time frames; conduct petitioned public health assessments; conduct pilot health effects studies; conduct epidemiologic studies; establish exposure registries; and initiate health surveillance programs.

- **Education of health professionals:** Develop educational materials and short courses for health professionals on the toxic effects of hazardous substances.
- **Peer review:** Ensure that all ATSDR studies and research are peer reviewed.
- **Congressional reports:** Provide Congress with a biennial report of ATSDR activities and a special report on the nature and extent of lead poisoning in children from environmental sources.

Additional Legislation

ATSDR has additional mandates under several other statutes. The Medical Waste Tracking Act mandated the agency's 1990 report to Congress on the public health implications of medical waste. That report was delivered to Congress in September 1990.

Section 106 of the Great Lakes Critical Programs Act outlines the following mandates:

- ATSDR and the Great Lakes States submit to Congress a report assessing the adverse effects of water pollutants in the Great Lakes System on the health of persons in Great Lakes states and on the health of fish, shellfish, and wildlife in the Great Lakes System. This joint ATSDR/EPA report was written in fiscal year (FY) 1995 and will be submitted to Congress in FY 1996.
- In conducting research in support of this report, the ATSDR administrator may, where appropriate, provide for research to be conducted under cooperative agreements with Great Lakes states. The ATSDR Great Lakes Human Health Effects Research Program was continued in FY 1995.

Section 901 of the Clean Air Act mandates that, in conducting the research program under this subsection, the EPA administrator will develop methods and techniques necessary to identify and assess the risks to human health from both routine and accidental exposures to individual air pollutants and their combinations. This research program will include the following elements:

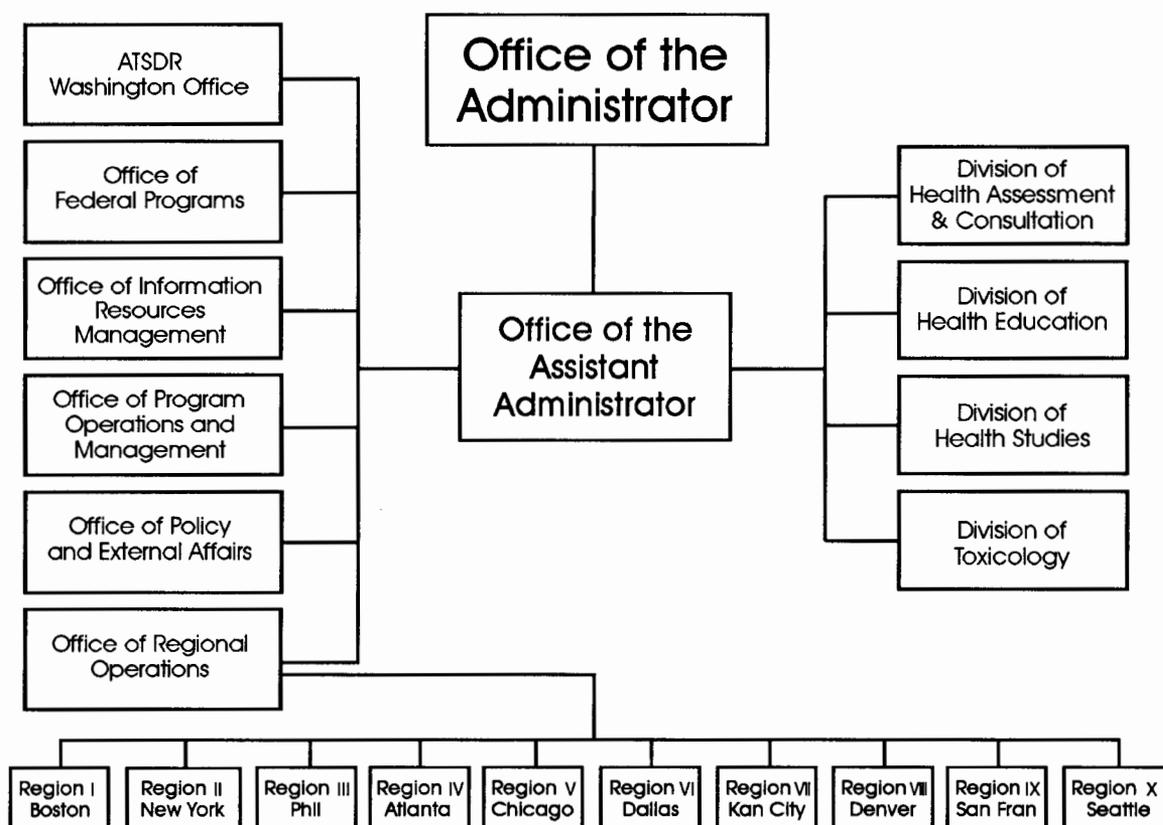
- The creation of an interagency task force to coordinate the program. The task force will include representatives of NIEHS, EPA, ATSDR, the National Toxicology Program, the National Institute of Standards and Technology, the National Science Foundation, the Surgeon General, and the Department of Energy (DOE). No ATSDR activities took place in FY 1995.
- An evaluation of each of the hazardous air pollutants listed under Section 112(b) of this Act, to decide, on the basis of available information, their relative priority for preparation of environmental health assessments. The evaluations will be based on reasonably anticipated toxicity to humans and exposure factors, such as frequency of occurrence as an air pollutant and

volume of emissions in populated areas. These evaluations will be reviewed by the interagency task force. In FY 1995, ATSDR's Division of Toxicology provided EPA with comments on the toxicity of specific substances.

Under the Housing and Community Development (Lead Abatement) Act of 1992 (H.R. 5334), EPA, in conjunction with ATSDR and the Secretary of Housing and Urban Development, will "sponsor public education and outreach activities to increase public awareness of 1) the scope and severity of lead poisoning from household sources; 2) the potential exposure to sources of lead in schools and childhood day care centers; 3) the implications of exposures for men and women, particularly those of childbearing age; 4) the need for careful, high-quality abatement and management actions; 5) the need for universal screening of children; 6) other components of a lead poisoning prevention program; 7) the health consequences of lead exposure resulting from lead-based paint hazards; 8) risk assessment and inspection methods for lead-based paint hazards; and 9) measures to reduce the risk of lead exposure from lead-based paint." In FY 1995, ATSDR's Division of Health Education prepared and distributed educational materials on preventing lead exposure.

Organizational Structure

The agency executes its operations through four program-specific divisions (see organizational chart). The sections following the chart describe the responsibilities of each division.



Division of Health Assessment and Consultation

- complete public health assessments for all sites on the NPL within 1 year of the date they are proposed for addition;
- address petitions for public health assessments;
- provide consultation on health issues related to exposure to hazardous or toxic substances, and, upon request, provide consultation, on the basis of available information, to the administrator of EPA and to state and local officials on health issues related to exposure to hazardous or toxic substances;
- determine the extent of danger to public health from a release or threatened release of a hazardous substance; and
- conduct public health assessments of landfills or surface impoundments that pose a substantial potential risk to human health because of the existence or releases of hazardous substances, the magnitude of contamination with hazardous substances that may be the result of a release, or the magnitude of the population exposed to such release or contamination.

Division of Toxicology

- revise the ATSDR/EPA Priority List of Hazardous Substances not less than once a year. It must include any additional hazardous substances found to pose a significant potential threat to human health;
- prepare a toxicological profile for each hazardous substance on the priority list prepared by ATSDR and EPA. Each profile must contain
 - an examination, summary, and interpretation of available toxicologic information and epidemiologic evaluations on the hazardous substance to determine the levels of significant human exposure for the substance and the associated acute, subacute, and chronic health effects
 - a determination of whether adequate information on the health effects of each substance is available or is in the process of being developed to determine levels of exposure that present a significant risk to human health of acute, subacute, or chronic health effects
 - when appropriate, an identification of toxicologic testing needed to identify the types or levels of exposure that may present significant risk of adverse health effects in humans;
- provide consultations on health issues related to exposure to hazardous or toxic substances, including emergency response consultations that determine the extent of danger to public health from a release or threatened release of a hazardous substance;
- in cooperation with the National Toxicology Program, conduct a program of research to determine the health effects of substances for which ATSDR, EPA, and other Public Health Service agencies have found that information is

inadequate. Congress intended that the cost of conducting the research program be borne by private industry using the Toxic Substances Control Act (TSCA) or the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), or through cost recovery under CERCLA.

Division of Health Studies

- conduct periodic survey and screening programs to determine relationships between exposure to toxic substances and illness;
- conduct pilot studies of the health effects of toxic substances for selected groups of exposed individuals to determine the desirability of conducting full-scale epidemiologic or other health studies of the entire exposed population and of conducting other epidemiologic studies when appropriate;
- conduct epidemiologic studies designed to evaluate the causal nature of associations between exposure to hazardous substances and disease outcome by testing scientific hypotheses;
- conduct health surveillance programs of exposed populations, which shall include medical testing and referral for treatment; and
- in cooperation with the states, establish and maintain national registries of 1) persons exposed to hazardous substances and 2) persons with serious diseases or illness. In addition, SARA mandates that ATSDR must consider establishing a registry as a followup to a public health assessment when the results indicate a potentially significant risk to human health.

Division of Health Education

- assemble, develop as necessary, and distribute to the states, and upon request to medical colleges, physicians, and other health professionals, appropriate educational materials (including short courses) on the medical surveillance, screening, and methods of diagnosis and treatment of injury or disease related to exposure to hazardous substances.

ATSDR Budget and Appropriations History

ATSDR receives funding through EPA and personnel allocation through the Centers for Disease Control and Prevention. Funding for federal facility sites is negotiated with the Department of Defense (DOD) and the Department of Energy (DOE).

Figure 1 is a breakdown of ATSDR's Superfund budget obligations by budget activity from FY 1991 through FY 1995.

Figure 2 lists staffing levels by fiscal year for CERCLA and federal (DOD and DOE) positions from FY 1991 through FY 1995. In FYs 1994 and 1995, the agency experienced a substantial decrease in staffing levels, primarily the result of a national effort to reduce the size of the federal workforce.

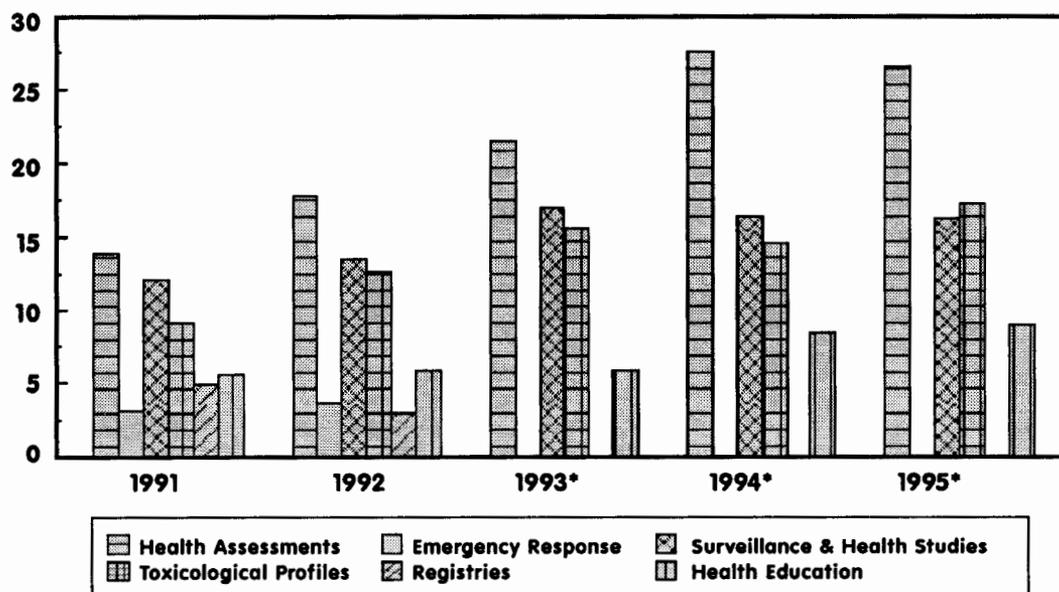
ATSDR is mandated to conduct public health assessments, health studies, surveillance activities, and health education at 143 federal NPL waste sites, as well as to

develop toxicological profiles of high-priority chemicals found at these sites. This task is made complex by the absence of a mandate to federal agencies (with the exception of DOD) to provide ATSDR with the necessary staff and budget to conduct those activities. ATSDR negotiates with DOD and DOE to establish annual plans of work and the budget necessary to conduct DOD and DOE programs. Figures 3 and 4 illustrate ATSDR's FY 1995 total operating budgets by budget activity for DOD and DOE efforts.

Cost Recovery

CERCLA, as amended by SARA, provides for the recovery of costs incurred by ATSDR for public health assessments, health studies, and certain other health-related activities from the party or parties responsible for the release of contaminants or contamination of the environment by toxic substances. The ATSDR cost recovery activity monitors both direct and indirect costs incurred by ATSDR for each Superfund site and prepares cost recovery packages upon request from EPA. During FY 1995, ATSDR prepared and submitted to EPA 405 cost recovery packages representing \$15.6 million (see Figure 5). The number of cost recovery packages requested by EPA decreased 12% from the number requested in FY 1994; however, the dollar value increased by 80%. The decrease in the number of EPA requests for cost recovery packages may have been the result of fewer requests from EPA during its recent departmental realignment and reorganization. The increase in the dollar value of the cost recovery packages during FY 1995 is attributable to the size and complexity of the sites for which EPA is requesting information, the nature and extent of the work performed by ATSDR, and the fulfillment of requests for information not previously available.

Figure 1. ATSDR CERCLA (Nonfederal Obligations), FY 1991-FY 1995



* The budget categories were revised in FY 1993.

Figure 2. Summary of FTEs by Fiscal Year

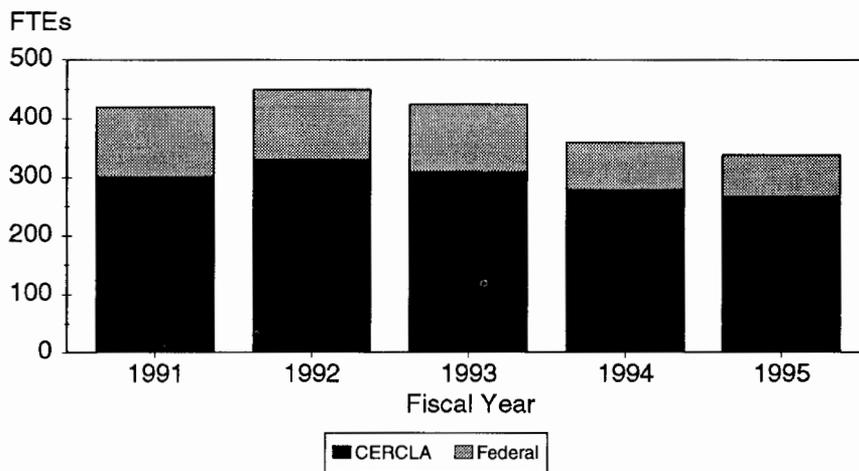


Figure 3. Department of Defense FY 1995 Operating Budget

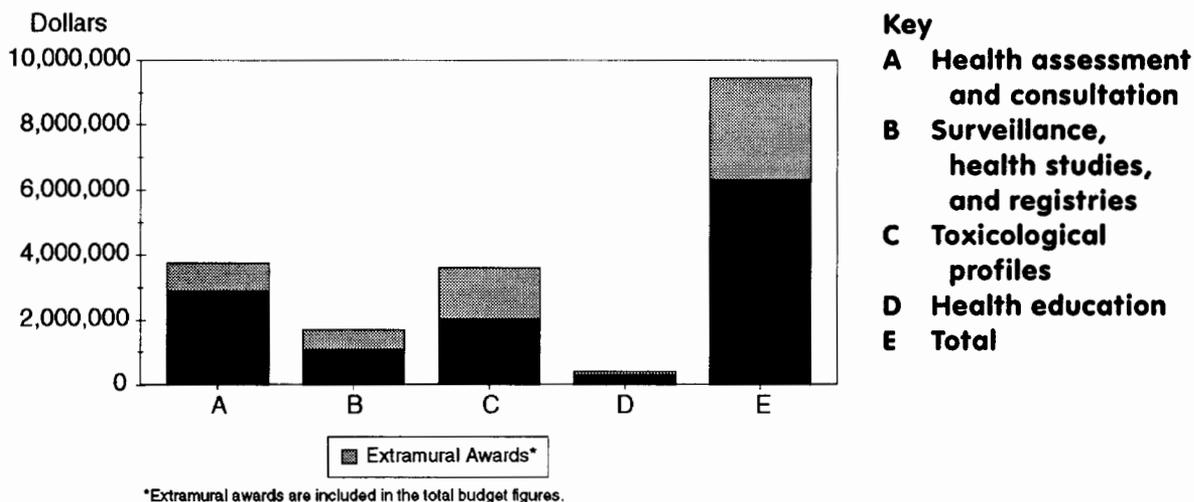


Figure 4. Department of Energy FY 1995 Operating Budget

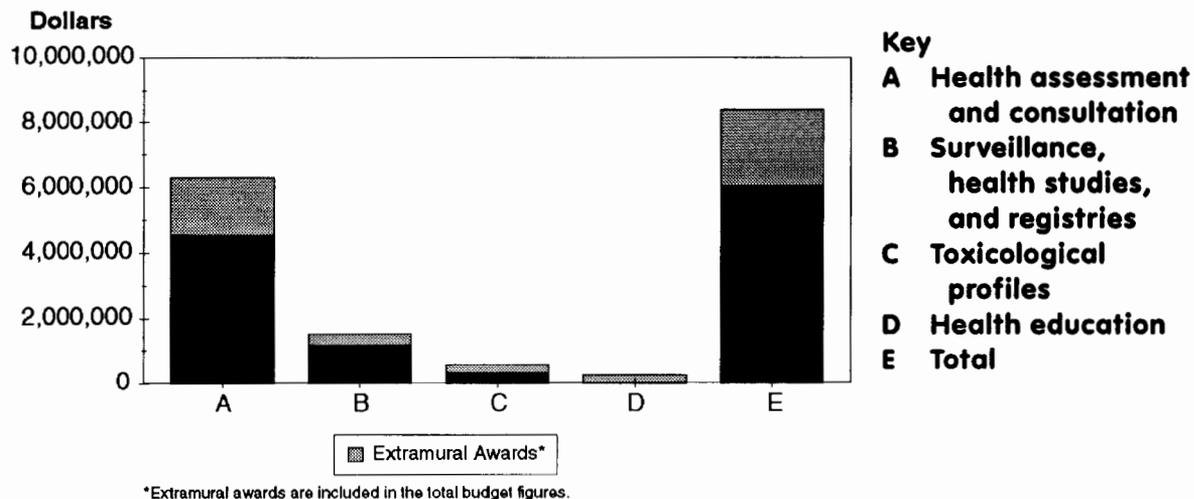
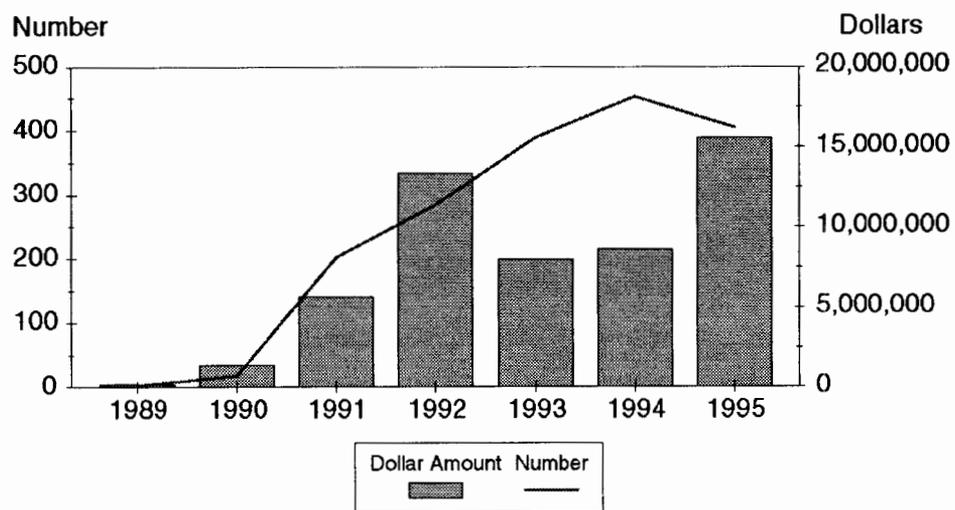


Figure 5. Number and Dollar (\$) Amount of Cost Recovery Packages Submitted to EPA Since FY 1989.



**ATSDR FY 1995
Annual Report
xx**



Division of Health Assessment and Consultation

ATSDR and its cooperative agreement states performed more than 1,300 health activities, including 35 public health assessments of uncontrolled hazardous waste sites, in 49 states (North Dakota was the exception) and the District of Columbia, Puerto Rico, and the U.S. Virgin Islands during fiscal year (FY) 1995.

The agency estimates that more than 467,000 people live within a 1-mile radius of the sites that were the subjects of FY 1995 public health assessments and public health advisories. Estimates indicate that more than 61,000 were exposed to contaminants and that more than 312,000 were potentially exposed. The completed pathway identified most often at sites where exposure was known or potential was soil of unspecified depth; more than 260,000 people live within a 1-mile radius of the sites where a soil pathway exists.

Inorganic substances, halogenated pesticides, and volatile organic compounds (VOCs) were the three classes of contaminants identified most frequently in agency responses. The inorganic substances discussed most often were lead, arsenic, and mercury. The halogenated pesticides included polychlorinated biphenyls (PCBs) and chlordane; the VOCs included trichloroethylene, tetrachloroethylene, and benzene. The media in which these contaminants were found differed depending on the instrument used for reporting public health evaluations. For public health assessments, the medium most often identified as contaminated was groundwater. Soil, surface water, and air followed in order. For health consultations, soil was the medium identified most often, followed by air and water. All classes of water were reported in aggregate in the consultations. The differences in media affected may be related to the origin of the request and the media sampled most commonly.

Public health assessments and advisories completed in FY 1995 concluded that approximately 51% of the sites investigated were of public health concern or urgent public health concern. Another 24% classified sites as indeterminate or potential health concerns; 25% classified sites as no apparent or no health concerns.

Public health assessment recommendations fell into three categories: recommendations to provide better site characterization, recommendations to cease or reduce exposure, and recommendations for public health actions. The most common recommendations were for additional site characterization, better definition of the extent of contamination; additional monitoring data, more accurate definition of exposure potential; and site-specific health education to increase community members' understanding of the public health implications. Although less common, there were recommendations for such public health activities as biomedical testing, evaluations of exposure indicators, reviews of health statistics, and additions of exposed populations to specific subregistries. Following are details of ATSDR's FY 1995 public health assessment activities.

Public Health Assessments

A public health assessment is a review of information about hazardous substances at a site and an evaluation of whether exposure to those substances might harm people.

The agency, in collaboration with 22 state health departments under cooperative agreements, completed 35 public health assessments, including 2 petitioned health assessments, and issued 2 public health advisories during this reporting period (see Appendix A). In addition, 45 public health assessments were released for public comment, and 91 final release documents were distributed. Also completed were 56 site reviews and updates of 52 sites assessed early in the agency's existence.

Forty-six percent of sites evaluated in FY 1995 were classified as public health hazards—sites with documented current or past exposure or probable future exposure. Other public health assessments and public health advisories completed during the year classified sites in the following manner: urgent public health hazard—sites with current high exposure (5%); potential/indeterminate public health hazard—sites for which data are lacking (24%); no apparent public health hazard—sites for which available data indicate that any present or past exposure is below a level of health hazard (22%); and no public health hazard—sites for which data indicate no current or past exposure or no potential for exposure (3%).

The percentages of sites in the public health hazard and urgent public health hazard categories have remained about the same since 1993 (see Table 1). However, in FY 1995, there was a significant increase in the percentage of sites in the no apparent public health hazard category and a corresponding decrease in the percentage identified as indeterminate. Several factors influenced that shift:

- Assessors recommended public health actions through other public health instruments early in the process, and the recommendations resulted in elimination of public health threats before the completion of the public health assessment.
- Agency-funded research provided health assessors with information that included better definitions of toxicity and the public health implications of exposure to contaminants.
- Involvement with the U.S. Environmental Protection Agency (EPA) earlier in the process promoted more effective data gathering.
- Improved health assessment training workshops and advanced courses led to increased ability to evaluate public health implications.

Sites classified as no apparent public health hazard should not be interpreted to be sites not meriting remediation; the designation identifies sites where human exposure to contaminated media is occurring or has occurred in the past, but where the exposure is below a level considered to be hazardous.

From the information in the public health assessments and public health advisories, ATSDR has been able to make important observations about the types of con-

Table 1. Public Comment PHAs and Health Advisories by Hazard Category for FY 1993-1995

Hazard Category	FY 1993		FY 1994		FY 1995	
	Number	(%)	Number	(%)	Number	(%)
1-Urgent PHH*	3	(5)	4	(6)	2	(5)
2-PHH*	32	(47)	35	(50)	17	(46)
3-Indeterminate PHH*	23	(35)	23	(33)	9	(24)
4-No Apparent PHH*	7	(11)	6	(8)	8	(22)
5-No PHH*	1	(2)	2	(3)	1	(3)
Subtotal	66	(100)	70	(100)	37	(100)

* Public health hazard

taminants that threaten the country's public health, the environmental media that are most affected by those contaminants, and the pathways by which people are exposed to contaminants. However, these observations apply only to what the agency has been able to measure. In fact, data gaps remain (for example, soil gas sampling at landfills and indoor air monitoring are infrequently performed, but would provide important information about public health consequences).

Figure 1 illustrates the frequencies (%) with which the top 10 contaminant classes of concern were identified at sites for which public health assessments were prepared in FY 1995.

For the most part, contaminants for sites in all health hazard categories with completed exposure pathways were identified in soil of unspecified depth (53%), groundwater (private wells) (40%), air (33%), and fish (27%). The frequency with which the contaminants were identified in those media may reflect the fact that those media are most frequently sampled rather than that the contaminants are more likely to be found in those media. Again, data gaps exist for some media.

Inorganic compounds and VOCs (each 43%) were the most common classes of contaminants of concern at sites categorized as urgent public health hazards or public health hazards, followed by halogenated pesticides (41%) and polycyclic aromatic hydrocarbons (35%). The same trends held true for sites categorized as indeterminate or potential public health hazards.

Figure 2 describes the most commonly identified contaminants of concern at sites in FY 1995, regardless of public health hazard category.

Figure 3 illustrates the most common specific contaminants of concern identified at sites classified as urgent public health hazards or public health hazards with completed exposure pathways.

ATSDR also gleaned information from the 35 public health assessments and 2 public health advisories about how the public is exposed to contaminants (e.g.,

Figure 1. Classes of Contaminants of Concern Most Often Identified in Public Health Assessments and Public Health Advisories for All Routes of Exposure

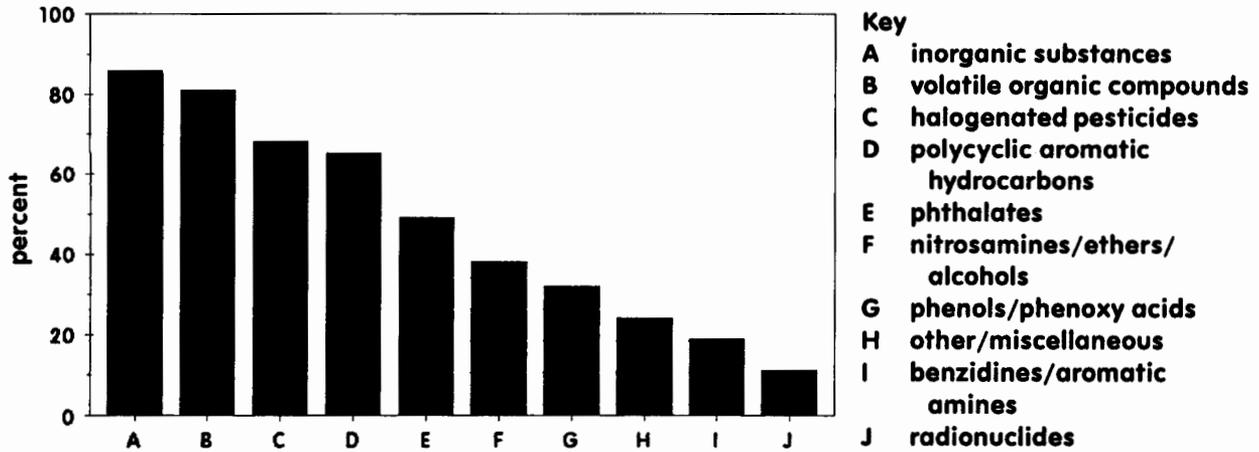


Figure 2. Contaminants of Concern Most Commonly Identified at Sites for All Hazard Categories and Routes of Exposure

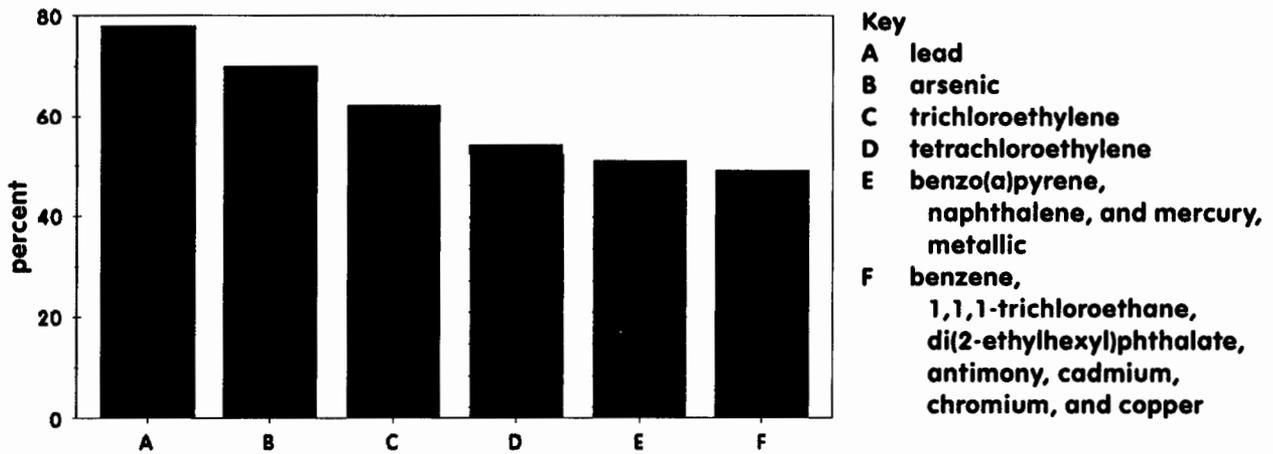
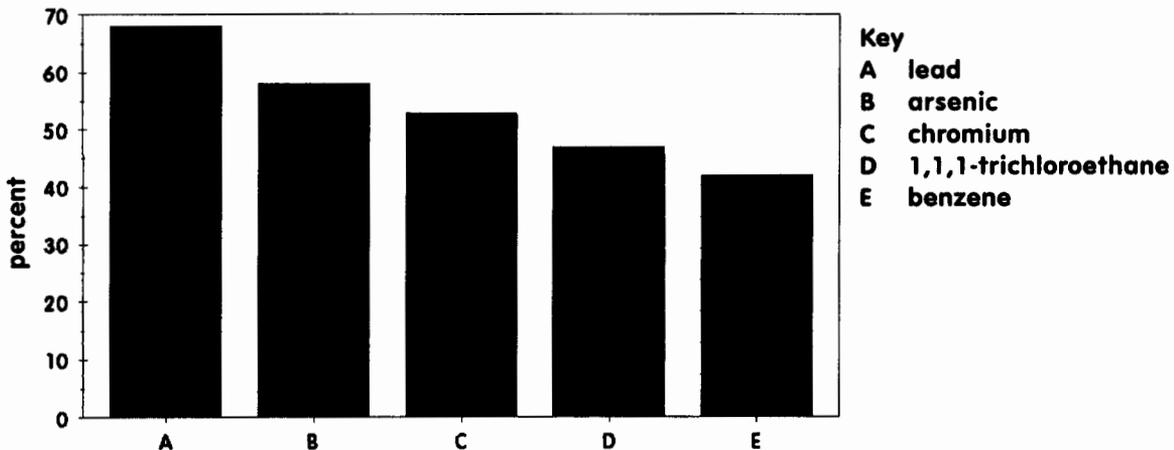


Figure 3. Contaminants of Concern at Sites Classified as Urgent Public Health Hazard or Public Health Hazard With Completed Exposure Pathway



inhalation, ingestion, dermal contact, and radiation from radioactive materials). For these sites and for people known to have been exposed to site-related contaminants, the most frequent exposure routes were ingestion and inhalation (at 27 sites each), followed by dermal contact (23 sites). Exposure to radiation from radioactive materials was seen at only 2 of the sites ATSDR was involved with in FY 1995. The most frequent exposure route for those public health assessments having a hazard category of urgent public health hazard or public health hazard in FY 1995 was ingestion; ingestion was also the most frequent exposure route in fiscal years 1993 and 1994.

Approximately 185 recommendations were made in public health assessments and public health advisories during FY 1995. Forty-six percent of the recommendations were for additional characterization of the sites; 33% involved preventing human exposure to site contaminants.

For all public health assessments and public health advisories completed in FY 1995, regardless of public health category, the number one and two recommendations made regarding site characterization were for additional site characterization or sampling (29%) and for additional or continued monitoring (21%).

For all public health assessments with cease or reduce exposure recommendations, the number one recommendation was to restrict site access (26%); site access restrictions include erection of fencing or use of security guards.

Because of the health hazards posed by the contaminants identified in public health assessments, approximately 86% recommended some type of follow-up public health action (i.e., health study, community and health professions education, substance-specific research, or public health investigation). Fourteen percent of the sites (primarily those in the indeterminate and no apparent or no public health hazard categories) did not require follow-up public health actions.

For the 86% of sites requiring follow-up actions, site-specific environmental health education was recommended for 81% and some type of public health investigation for 12%. At many of those sites, multiple health investigations were deemed necessary. Public health investigations undertaken at those sites included those described in Table 2.

Petitions for Health Assessment

Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund), individuals or physicians may petition ATSDR to conduct public health assessments for hazardous waste sites or releases where there are health concerns about possible exposure to hazardous substances. ATSDR has a mandate to consider each petition received and to respond to the petitioner. The agency maintains a petition screening committee to evaluate available information for petition sites, decide whether the petitions meet ATSDR's criteria for conducting public health activities, and recommend appropriate responses. Scientists and managers experienced in public health assessments and related areas make up the committee.

Table 2. Types of Public Health Investigations Recommended at Specific Sites

Type of Public Health Investigation	Definition	% of All Public Health Investigations (FY 1995)
Indicators of exposure	Tests for substance or metabolite; show exposure has occurred	3%
Biomedical testing	Tests for physiologic function; show adverse effects	3%
Community health investigation	Information is given to the community; exposure is possible; concern for public health exists	0%
Disease- and symptom-prevalence study	Study of self-reported conditions; exposure is documented or likely; assists in generating hypotheses	0%
Health statistics review	Analysis of existing health data; exposure is documented or concern exists	3%
Registry referral	Addition to established subregistry; exposure is documented over time; participants are followed over time	3%

In FY 1995, the ATSDR petition screening committee broadened its scope of activities, and agency health educators became active participants in its activities. For example, when a site's assigned health assessor presents information about a site to the screening committee, the need for specific health education activities is sometimes apparent. At some petition sites, the agency's health educators have initiated immediate education activities.

The petition screening committee's evaluation of each petitioner's public health concerns using established criteria provides an internal mechanism for ensuring uniform consideration of all petitions. The committee's work allows ATSDR to focus its resources—sooner and in greater amount—on the petitions with the most significant public health needs.

In FY 1995, the committee reviewed reports on 21 petition sites. For 12 of the 21 sites (57%), the committee found that additional public health evaluations were necessary to determine the public health threat from plausible exposures to hazardous substances, and to identify necessary follow-up public health activities. Health consultations for the 12 sites were either under way or scheduled by the end of the year.

Petitions for nine sites did not meet ATSDR's criteria for public health activities. For each of those sites, however, the initial investigations considered whether hazardous substances were present in the environment, whether people were potentially exposed in a way that could be a public health concern, and whether the community's health concerns were plausibly related to a release of hazardous sub-

stances. ATSDR provided the results of each investigation, and any recommended alternative actions, to the appropriate petitioners. While considering five of the nine sites, ATSDR performed limited evaluations of environmental health data in response to public health concerns identified during the initial investigations. The limited evaluations addressed concerns identified during those investigations, but not related directly to the sites.

In FY 1995, the petition screening committee began emphasizing data needs earlier in the development of an agency response to a petition. The committee recommended collaboration with external agencies such as EPA and state health departments early in the petition process as a way to ensure that data needed for a comprehensive response would be available. The committee recommended that health consultations be developed to address specific public health issues for the majority of sites presented to the committee during this reporting period.

Public Health Assessment Enhancement Initiative

During this reporting period, the agency addressed the need for a more customer-oriented, phased approach to public health assessment through its Public Health Assessment Enhancement Initiative. The initiative promotes closer cooperation among ATSDR and other stakeholders, including the EPA, state and local environmental and health departments, and community members. The changes described in the following paragraphs ensure that ATSDR activities are better integrated into the clean-up efforts of the CERCLA program and are more responsive to community health concerns.

As part of the Public Health Assessment Enhance Initiative, the following changes were made in FY 1995 to the public health assessment process:

- ATSDR's involvement is earlier and continuous, beginning at the site assessment phase rather than at the proposal of the site to the EPA's National Priorities List (NPL).
- Efforts to engage community members start sooner in the process.
- Evaluations of public health take place earlier and are more targeted; the release of interim findings takes place as needed throughout the public health assessment.
- Fewer sites are classified as indeterminate public health hazards because earlier determinations of possible human exposure enable assessors to better evaluate existing or potential health hazards.
- Action on most recommendations is complete when the public health assessment document is made final.

The initiative enhances public health assessment through the following activities:

- Gives ATSDR the flexibility to provide health information to EPA and state and community health organizations at multiple points in the Superfund process; the same site may be the subject of a variety of responses.

- Allows ATSDR to address public health aspects at the time of important risk management decisions (e.g., points of early action) by EPA or state and local health departments. It also encourages the agency to address particular health issues of concern to the community, ensuring that all participants consider public health perspectives at critical points in the Superfund process.
- Supports application of ATSDR resources at public health priority sites early in the process.
- Provides ATSDR with the flexibility to obtain human exposure data through such activities as exposure point sampling and personal monitoring and to work closely with EPA and other risk managers to design environmental sampling strategies that address public health issues.

These enhancement activities permit ATSDR's involvement at any phase of the Superfund process. They help the agency to address the five elements of public health assessments defined in CERCLA: nature and extent of contamination, potential pathways of human exposure, demographics, public health implications, and the comparison of morbidity and mortality data.

Public Health Assessment Enhancement Pilot Sites

In May 1995, ATSDR instituted a pilot program embracing five sites as part of the initiative. The five sites are the Saltville Waste Disposal Site, Saltville, Virginia; the Spectron Site, Elkton, Maryland; the Agriculture Street Landfill Site, New Orleans, Louisiana; the Highway 71/72 Refinery Site, Bossier City, Louisiana; and the Thompson Hayward Site, New Orleans, Louisiana. The pilot program will continue through FY 1996.

Saltville

The Saltville Waste Disposal Site in Virginia is a good example of the community involvement benefits of the Public Health Assessment Enhancement Initiative.

In July 1994, the Virginia Department of Environmental Quality (VADEQ) requested that ATSDR evaluate contamination in Saltville because of past waste disposal activities at the site. Because contamination is not limited by site boundaries, discussions and activities have centered on both on-site concerns and concerns of citizens in the surrounding community. In March 1995, the Saltville public health assessment team, including representatives from ATSDR, VADEQ, EPA, and the Abington Department of Environmental Quality, used information they gathered from residents at a November 1994 community meeting to develop ATSDR's health assessment plan for Saltville. The plan included a significant commitment to community involvement.

Impact of PHA enhancement at this site: Innovative community outreach and involvement activities have included the development of ATSDR's first community involvement plan for a site. The team also sponsored an educational workshop, the first in which each team member addressed a specific area of the site and related plans for responding to citizens' concerns. The key to the success of the Saltville

team is that representatives of ATSDR, EPA, and VADEQ are working with the residents at every step to decide what site activities team members and the agencies they represent need to pursue.

Agriculture Street Landfill

The Agriculture Street Landfill Site in Louisiana offers testimony to the impacts the enhancement initiative has had on public health.

The Agriculture Street Landfill is a former landfill now being developed in part for residential use. The NPL site has been classified as a public health hazard because of widespread lead contamination in soil.

Findings to Date: Blood lead testing conducted in the past indicated some high blood lead concentrations in children living on and around the site. Recent data, however, show that the lead levels for those children are no higher than those for children living elsewhere in the city of New Orleans. For purposes of public health assessment, the site was separated into four geographic areas, which were evaluated individually: (1) Study Group Residences (selected homes in the residential area), determined to be of no apparent public health hazard on the basis of lead levels, although certain "hot spots" of lead in residential soil should be remediated; 2) Press Park and the Community Center, also categorized as no apparent public health hazard, but containing hot spots of arsenic and polycyclic aromatic hydrocarbons in soil needing remediation; 3) the Undeveloped Area, categorized as a public health hazard because of the presence of contaminants at levels of health concern; and 4) the Moton Elementary School, categorized as no public health hazard because excavation during construction removed contaminated soil within the top 3 feet of the surface and replaced it with clean backfill.

Results: Recommendations in the Agriculture Street Landfill public health assessment have had significant effects in the area around the site. For example, students were moved out of the relatively new Moton Elementary School building before the public health assessment because residents were concerned about lead and pesticide contamination in soil under and near the building. Health assessors reported that contaminated soil had been removed during construction and replaced with clean fill material.

Many service workers had been reluctant to enter areas around the landfill because of fears of adverse health effects from the contamination. Assessors notified city administrators that relatively large areas around the site are free of contamination at levels of concern; as a result, citizens have been able to begin negotiations to ensure that service workers, such as plumbers and cable television technicians, will work again in the areas that are free of contamination at levels of concern.

Residents of a retirement home near the site had expressed concerns about the potential effects of contaminants on their health. ATSDR and the Louisiana Office of Public Health arranged for a representative of the home to join the informal group of concerned citizens. That group is negotiating with city officials on issues concerning the health effects of contamination around the site.

ATSDR and state health department staff members have also published a resource guide that contains information on all agencies that have been involved in the site assessment and subsequent clean-up activities. The guide includes names and telephone numbers of the agencies' representatives with whom citizens can discuss their specific concerns.

Community Outreach

ATSDR conducts collaborative work with site communities at each phase of a health consultation or public health assessment to ensure that actions and documents accurately reflect community health concerns. In FY 1995, community involvement gained additional importance as an integral factor in the preparation and dissemination of agency products. The Public Health Assessment Enhancement Initiative described previously supports agency commitment to early and continuous community involvement and effective communication of risks potentially associated with hazardous waste and toxic substances. The enhancement initiative calls for community involvement staff members to collaborate with scientific staff members early in the assessment process. That early collaboration seeks to develop credibility and trust with site-related communities as partners in the development of agency products. The initiative also promotes early and continual community involvement through emphasis on direct contact with community groups, focus groups, distribution of community notices and fact sheets, and the use of community assistance panels.

The following summaries illustrate types of outreach activities conducted during FY 1995 at sites with heightened community concerns.

South Tifton

Community Involvement Activities: ATSDR has been heavily involved in the EPA Environmental Justice Initiative in South Tifton, Georgia, a community that has eight known hazardous waste facilities.

A community involvement specialist has worked closely with the Tifton community since receipt of a petition in November 1993. The specialist established a document repository at the community center and continues to ensure that appropriate toxicological profiles and additional written information are readily available.

At ATSDR's request, EPA initiated a community-wide soil sampling program that included priority pollutant analysis for nine composite samples from each of a group of 500-foot-square grids within a 1-mile radius of the center of the community.

ATSDR's community involvement specialist, along with the EPA community involvement specialist responsible for the site, obtained written authorization from several hundred residents for EPA to come onto their property and collect soil and well water samples. They visited door-to-door explaining the sampling plan and the reasons for collecting the soil and water samples.

The community involvement staff arranged meetings with representatives of the Citizen League Opposed to Unwanted Toxins (CLOUT) and People Working for

People (PWP) as well as separate meetings with the health officer, county board of health, the principal of the J.T. Reddick Middle School, and the assistant administrator of operations for the Tift General Hospital. ATSDR health education and regional representatives helped community involvement staff members gather background information for preparing a needs assessment to identify community concerns.

The information and requests gathered from the community meetings indicated that community members want extensive additional information about site assessment findings. The community involvement staff scheduled a public meeting to explain county and district cancer rates and cancer death rates; a public availability session to explain the results of the soil sampling; and a third meeting for health education on contaminant levels and their associated dangers, relative risk information, reference materials on background concentrations of naturally occurring elements and compounds, and cancer and birth defects information. Community members also requested written explanations of findings from blood lead testing of 90 children.

Results: Two of the 500' x 500' grids sampled contained lead and a variety of pesticides at levels of health concern. Although neither of these grids could be connected to any of the known facilities in the South Tifton community, EPA investigators agreed to re-sample the two grids to try to determine the source of the contamination. Representatives of ATSDR's community involvement activity, regional operations, and health education staff are continuing to communicate with members of community groups and are working with EPA and district health office staff members to develop the joint community education program the community members requested. The community involvement specialist worked with other agency staff members to develop a directory of contacts at ATSDR, EPA, state and local health departments, and local facilities and organizations.

Keystone Sanitary Landfill

Community Involvement Activities: The Keystone Sanitary Landfill is in a rural, farming community near the state boundaries of Maryland and Pennsylvania. It was placed on the NPL in the late 1980s. Keystone was the region's disposal site for all household and much industrial waste for more than a decade. Waste management practices contaminated groundwater with a variety of chemicals, ranging from heavy metals to volatile organic compounds.

ATSDR community involvement staff members have helped establish a strong relationship between ATSDR and EPA Region III, the Maryland Department of the Environment, the Pennsylvania Department of Health, and residents of the Keystone community. The community has truly become a public health "customer." Community involvement activities at Keystone focused on identifying and responding to the community's public health needs.

The community involvement staff members worked with the technical project officer, ATSDR's regional representative, EPA's remedial project officer for the site, staff members from Pennsylvania and Maryland, and local residents to define the

community's needs, that is, what public health actions community members want accomplished at the site.

Results: ATSDR staff members addressed the identified public health needs through ongoing and frank discussions, which led to cooperation among representatives of the community, ATSDR, and the state health departments.

ATSDR staff members also developed innovative communications concepts for promoting broad-based community response. For example, they held potluck suppers at a local church in the spring of 1995 instead of convening a typical public meeting. During these community suppers, ATSDR learned that community members' greatest concern was that their private wells, the community's sole source of drinking water, might be contaminated by toxic releases from the landfill.

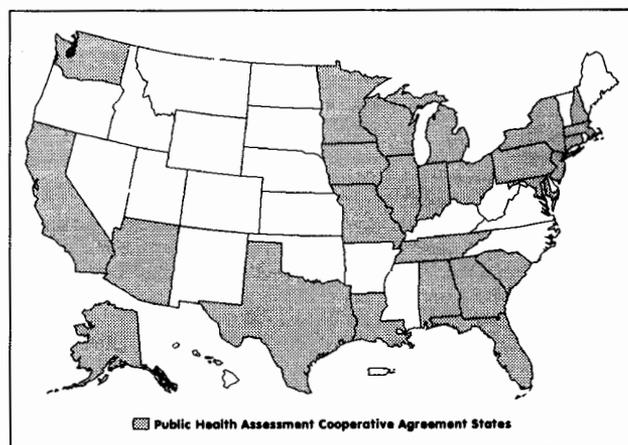
As a result, ATSDR staff members and community representatives negotiated a specific public health action: a recommendation to EPA that an alternative water supply be provided to specified households whose private wells had been contaminated by releases from the landfill.

The public health team of ATSDR representatives, state health department staff members, and residents agreed on the alternative water recommendation that ATSDR wrote into its health consultation. EPA implemented ATSDR's recommendation, and the community saw its highest public health priority addressed.

Cooperative Agreement Program

DHAC works with and through state health departments participating in the Public Health Assessment Cooperative Agreement Program to evaluate the public health impact of CERCLA sites and conduct appropriate follow-up activities. ATSDR provides technical and administrative oversight of state-conducted site evaluations performed using ATSDR's format and guidance for public health assessments, health consultations, and site reviews and updates. State staff members, in turn, advise other federal, state, and local health and environmental agencies on a wide range of site-related environmental health issues.

During FY 1995, ATSDR had cooperative agreements with 26 states for the conduct of public health assessment activities. By working with its cooperative agreement states, ATSDR has significantly enhanced its ability to provide timely public health information to remedial decision makers at the federal, state, and local levels. In addition, ATSDR has increased the scope and quality of the public health services it can offer to members of communities located around hazardous waste sites. This partnership benefits participating states by providing state staff members with training and experience in



assessing the public health impact of human exposure to hazardous waste, and improving their access to the technical and scientific resources of ATSDR.

States participating in the cooperative agreement programs conducted public health activities at more than 400 sites during 1995. Site-specific activities were conducted at the request of a broad range of federal, state, and local health or environmental agencies or because of citizens' health-related concerns.

While conducting site evaluations consumed a significant amount of resources, state staff members also spent considerable time conducting community involvement activities. These activities included meeting with community members living near hazardous waste sites to gather information on health-related concerns, and addressing these concerns in face-to-face meetings, fact sheets or other written materials, or telephone followup.

Alabama Cooperative Agreement Activity

Health department staff members in Alabama have consulted with the public and the Alabama Department of Environmental Management and assisted with the public health review of proposed records of decision and site investigation workplans at numerous sites. The consultation program has evaluated the health hazard from contaminated media, identified specific sampling needs, and identified actions needed to protect public health.

Staff members working on the program have completed a study of health outcomes in the Grovewood Community in West Montgomery. The 200 residents believed the Grovewood Community had excess cancer rates and thought the cancers were caused by contaminants from the T.H. Agriculture and Nutrition NPL site. Program staff members conducted a household survey of all current and former residents and a medical records review of all reported cases of cancer. Although the study identified a rate of cancer more than twice the expected rate, environmental monitoring data and human exposure pathway analysis indicated that the increased rates did not appear to be related to the nearby T.H. Agriculture and Nutrition site.

Alabama cooperative agreement staff members provided community residents written materials on the causes, early diagnosis, and prevention of cancer. They also distributed written material and answered specific questions on cancer in public meetings, in one-on-one meetings, and by telephone.

New Jersey Cooperative Agreement Activity

During FY 1995, the New Jersey Department of Health (NJDOH) took the lead in exposure investigations around several NPL sites. These investigations were in response to a lack of data on human exposure pathways, concerns of potentially exposed citizens, and requests for assistance from the New Jersey Department of Environmental Protection and the Monmouth County Health Department. Representatives of the NJDOH worked with ATSDR and the local health agencies to gather necessary biologic and environmental data at the sites to more accurately define the nature and extent of human exposure.

The 12 participants received their exposure results, which staff members discussed with them. The other 3,500 community members received general results in fact sheets. Health professionals in the area were provided newsletters containing information on the hazardous waste sites, pathways of human exposure to site contaminants, and the toxicologic and human health effects associated with site contaminants.

Pennsylvania Cooperative Agreement Activity

Pennsylvania has more than 100 NPL sites needing public health evaluations. The Pennsylvania Department of Health (PADOH), under cooperative agreement with ATSDR, continues to provide evaluations of state hazardous waste sites to communities and ATSDR. Some of the work goes beyond the traditional public health assessment to include such activities as health consultations and technical assistance.

Pennsylvania's assessors recognized that health investigations must look beyond the immediate impact of a site and consider how community growth can make a difference. Work at Heleva Landfill in North Whitehall Township is an example of that philosophy.

The Heleva Landfill is no longer active, but groundwater contamination is migrating toward a community under development. PADOH's hydrogeologist determined that a small stream between the site and the new development is not likely to intercept all of the deep groundwater contaminants. PADOH representatives have agreed to help community members investigate problems and to answer questions as they arise.

On the recommendation of PADOH's hydrogeologist, some wells in the new subdivision were sampled. Very low levels of contaminants were found in one well; the evidence indicates that contamination from the landfill may eventually reach the new wells. PADOH's actions will play a major role in ensuring the water quality of the 80 people expected to occupy the homes of the expanding subdivision.

Public Health Advisories

A public health advisory provides a way for ATSDR to respond quickly when hazardous substances released into the environment pose an immediate and significant danger to human health. ATSDR alerts the EPA administrator in such cases and works with other government agencies on actions to protect the public. Following is a summary of the advisories issued by ATSDR in FY 1995.

Site Activities

ATSDR received notification from the EPA in April 1995 about three radiologically contaminated areas in Michigan. Information indicated that there might be more than 50,000 radium-containing aircraft gauges and possibly some unexploded ordnance at the sites. ATSDR investigators reviewed sampling data and determined that there were serious health issues at the sites.

Outcome

After visiting the area, ATSDR assessors issued two health advisories that ultimately resulted in two of the sites being included on the NPL. The third site, a private residence, was determined to need emergency removal action, which was handled by EPA. The advisory sites could impact two communities. In Benton Harbor, the estimated population is 4,654 residents within a 1-mile radius of the Aircraft Components (Michigan Radiologic) site, which is also known as the D&L Sales site. In Belding, the estimated population is 5,822 residents within a 1-mile radius of the H&K Sales (Michigan Radiologic) site.

Health Consultations

A health consultation contains advice on a specific public health issue related to documented or possible human exposure to toxic material.

ATSDR prepares health consultations in response to requests for information about health risks posed by a specific site, chemical release, or hazardous material. Health consultations can be either written or oral; they provide site-specific answers to specific questions. Consultations are timely; an oral consultation might be provided on the day a request is received. Most written health consultations are prepared within 2 weeks, provided that all of the required data are available from the requestor.

The following table reflects the origins of requests for more than 200 consultations during FY 1995:

Origin of Request	Percentage
EPA	69.5%
state environmental agencies	7.8%
state health agencies	6.3%
private citizens or communities	4.7%
other federal agencies	7.0%
cities	2.3%
counties	2.3%

In FY 1995, ATSDR exposure investigations and consultation staff members prepared 205 written and oral health consultations and provided approximately 400 technical assists; cooperative agreement states produced another 191 health consultations. Other ATSDR staff members completed approximately 25 more consultations. Recommendations made in health consultations are accepted and implemented in most instances.

An analysis of health consultations prepared during FY 1995 showed that contamination was found most often in soil, as it was in FY 1994. Contaminants were found in soil at about 57.8% of the sites evaluated. Contaminants found in drinking water, surface water, or groundwater, or generically reported as found in water,

accounted for 15%, and those in air, soil gas, or indoor air for 17.9%. Other minor pathways reported were indoor dust, sediment, and other miscellaneous pathways. The major contaminants of concern discussed in the consultations are heavy metals, including mercury, arsenic, and lead, at 38.6% of the sites. Other contaminants, in order of concern, were PCBs, VOCs, asbestos, and dioxins.

The following case reports describe typical actions taken as a result of health consultations and health consultation activities.

Lorain County, Ohio

In November 1994, ATSDR became involved in a public health response in Lorain County, Ohio, where an unlicensed pesticide applicator had sprayed the interior of as many as 600 homes with the pesticide methyl parathion. Methyl parathion is extremely toxic to humans and is approved only for outdoor use.

Results: ATSDR funded and assisted with a multi-agency effort that included collection of approximately 500 urine samples and blood samples to measure residents' exposure to methyl parathion. Other agencies involved were the U.S. EPA, the Ohio Department of Agriculture, the Ohio Department of Health, the Ohio Environmental Protection Agency, the U.S. Centers for Disease Control and Prevention (CDC), the Lorain County General Health Department, the Elyria City Health Department, and the Lorain City Health Department.

Investigators also used a questionnaire to gather such information as length of residence and individuals' reports of symptoms. Combining the data from the survey with biologic data will create background on the long-term health effects of low-level doses on women and children, particularly on the children's developing nervous systems. Most data predating this study are limited to the effects of occupational exposure on healthy men.

The biologic sampling results indicated that hundreds of individuals had been exposed to potentially harmful levels of the pesticide. This effort helped EPA identify residents with the greatest exposures so that clean-up activities could be prioritized and appropriate health follow-up activities initiated.

One hundred eighty-seven homes have been decontaminated; residents were temporarily relocated during the remediation. Approximately 38 homes remained to be decontaminated by EPA as the fiscal year ended.

Little Valley, Salamanca, New York

The New York State Department of Health (NYSDOH), under a cooperative agreement with ATSDR, prepared a health consultation on the Little Valley site. This consultation addressed past and ongoing exposures as well as the potential for future exposures in persons whose private drinking water wells were contaminated with trichloroethylene (TCE).

The source of the TCE groundwater contamination has not been determined. Possible sources of groundwater contamination in the Little Valley area include

active and inactive industrial sites. Groundwater sampling results indicate a plume of TCE extends from the southern end of the village of Little Valley to the northern portion of the City of Salamanca, which is part of the Allegheny Indian Reservation. Groundwater south of the northern portion of the City of Salamanca has not been sampled, but the NYSDOH will work with EPA to determine placement of monitoring wells to characterize the extent of contamination.

Conclusions: The site poses a public health hazard because of past, ongoing, and possible future exposures to VOCs in private water supplies. The hazard primarily relates to an unacceptable level of cancer risk.

Several private wells are contaminated with TCE at levels above federal and state drinking water standards. Exposure via inhalation, ingestion, and dermal absorption may have occurred for 13 years or longer. Without efforts to remediate the groundwater, contaminant levels in private water supplies may increase.

Recommendations: ATSDR and the NYSDOH have recommended action to dissociate people from contaminated water.

Results: The NYSDOH informed approximately 200 residents of the potential health implications of their exposures and ways to reduce those exposures. State and county health department officials advised residents with contaminated water supplies of the possible health effects of prolonged exposure to low levels of TCE. They recommended that residents boil their drinking water in an area with adequate ventilation, seek an alternative drinking water source, install carbon filtration systems, and limit showers to minimize dermal and inhalation exposures to TCE.

As the fiscal year ended, no affected well owners had been provided filters or alternative water sources. However, several well owners had independently installed filter systems, and some residents had purchased bottled water.

Primarily on the basis of the health consultation and a letter from ATSDR, EPA proposed the site for inclusion on the NPL.

Great Lakes Chemical Corporation, El Dorado, Arkansas

ATSDR provided two health consultations in FY 1995 regarding the Great Lakes Chemical Corporation site. The first consultation was in response to a petition from residents living near the Great Lakes facility who were concerned that they had been exposed to bromine releases from the facility. The second consultation, in July 1995, was in response to additional information submitted by the Great Lakes Chemical Corporation in response to the first consultation.

Conclusions: Both consultations determined that blood serum bromide data from the local residents indicated recent exposure to brominated compounds. From results of an exposure investigation, the second consultation further concluded that brominated compounds found in residential soil, garden produce, locally grown foods and locally produced milk, crawlspace air, and surface water were not at concentrations expected to cause the blood bromide concentrations found.

Recommendations: Both consultations recommended that the Arkansas Department of Pollution Control and Ecology conduct an ambient air monitoring program at the facility perimeter to determine whether facility emissions may be contributing to the observed blood bromide concentrations.

Results: By systematically ruling out sources of exposure, ATSDR helped the state environmental agency evaluate emissions from the facility that might account for the abnormal blood bromide concentrations observed in local residents. ATSDR is performing additional exposure investigations to evaluate the number of local residents who have abnormal blood bromide concentrations that may indicate exposure to facility emissions. ATSDR's efforts have also led to increased monitoring of facility operations by local regulatory agencies and to the development of health education efforts for both physicians and other local medical staff.

Fernald Environmental Management Project, Fernald, Ohio

ATSDR Activities: ATSDR staff members completed off-site environmental sampling for all contaminants except radon in groundwater, soil, air, milk, and locally grown produce in the Fernald area. The agency's ambient radon monitoring project has been expanded and extended. ATSDR radon monitors will be in place throughout the Department of Energy's (DOE) remediation of the K-65 silos. To respond to community members' concerns and questions about DOE data, monitoring will provide independent verification of DOE sampling data and measure the magnitude of radon emissions from the site.

A May 1995 health consultation addressed concerns about radon emissions from the K-65 silos, which are the sources of periodic leaks. Another health consultation, released in June 1995, addressed milk produced at farms near the Fernald site. ATSDR investigators continue to work on health consultations addressing the status of local produce, vegetation, and groundwater because residents have expressed concerns about contamination in soil, air, and water. ATSDR staff members were available to answer questions about the health consultations on milk and the K-65 silos at an ATSDR-sponsored information-sharing session in the Fernald community in June 1995. They also discussed forthcoming consultations and the agency's role as a public health advisor during the remediation work.

With CDC's National Center for Environmental Health, ATSDR staff members are involved in the startup of the Federal Advisory Committee Act (FACA) Health Effects Subcommittee at Fernald. The FACA subcommittee will involve the community in health-related issues and seek direction from the stakeholders for possible health studies and education.

Results: The milk consultation reassured the public that the milk produced in the area was safe to drink.

As part of the K-65 silo consultation, ATSDR staff members found that DOE's primary radon detectors for the silos did not work in cold weather. DOE scientists are now investigating their silo monitoring system. An undetected major radon release could affect 12,500 people over an area of 27,000 acres.

ATSDR investigators expect large quantities of soil to be disturbed during remediation of the silos. ATSDR's continued radon monitoring is designed to detect any significant off-site radon concentrations; if necessary, the agency will recommend appropriate remediation activities.

Demographic Analysis

ATSDR uses demographic analysis to characterize the population (including its size) living near hazardous waste sites, identify the extent and location of sensitive subpopulations exposed to site-related contaminants, and describe population trends. Health assessors use the data to conduct public health assessments and health consultations and to investigate environmental justice issues.

ATSDR staff members researched and published in the *International Journal of Occupational Medicine and Toxicology* (1995;4[3]:343-363) an article describing the total population of areas within 1 mile of 1,200 NPL sites by race and Hispanic origin. The research provides background for developing comprehensive demographic profiles of areas near hazardous waste sites and evaluating the extent to which minority group members are disproportionately represented near the sites. The article reported that demographic studies used to investigate whether minorities are more likely to live near hazardous waste sites have resulted in varying conclusions. Differences in the design of studies used to collect and compare demographic information may be responsible for some of the inconsistencies.

ATSDR researchers used the geographic information system (GIS) approach to characterize the populations near waste sites. They made an intracounty statistical comparison of racial and Hispanic origin subpopulations within 1 mile of a site and subpopulations living in the same county but more than 1 mile from the site. The results show that the percentage of the population in minority categories is higher nearer the NPL sites. The authors determined that GIS is appropriate for obtaining site-specific information and is useful as a tool in demographic studies of areas near environmental hazards.

Exposure Investigations

An exposure investigation collects information on specific human exposures through biologic sampling, personal monitoring, related environmental assessment, and exposure-dose reconstruction.

ATSDR's exposure investigations personnel provide the following services:

- develop and coordinate biologic sampling, personal monitoring, and related environmental assessment;
- conduct medical consultations and provide technical support in integrating health outcome data into public health assessments, public health advisories, and health consultations;
- identify, review, and evaluate health-related databases and health studies to assess past and current health outcomes and parameters associated with populations impacted by hazardous waste sites;

- evaluate the adequacy of environmental data to detect public health outcomes, assist in developing sampling strategies, and ensure a program for obtaining data necessary for the evaluation of hazardous substance releases; and
- conduct exposure-dose reconstruction analyses.

Exposure investigations have provided federal, state, and county environmental public health professionals with the exposure information they need to improve their public health decision making and to focus their resources on preventing or reducing exposure to environmental contaminants. Information from these exposure investigations has also given the public information that can be used to make decisions about personal health status.

ATSDR completed 10 exposure investigations in FY 1995: 5 biologic, 2 environmental, 2 biologic and environmental, and 1 exposure-dose reconstruction. Investigators obtained biologic samples from 274 participants and identified exposure to contaminants in 4 of the 10 completed investigations. These results have provided information for improved public health decision making at the sites involved. For example, at one site, the exposure results corroborated state regulators' findings that remedial efforts (that is, growing grass and paving) and education efforts were effective in reducing area residents' exposure to arsenic contamination. Health officials were also able to identify the likely vehicle of transmission for exposed residents.

The exposure investigations' findings addressed data gaps and helped local, state, and federal environmental and health agencies focus their resources on preventing or reducing exposure to environmental contamination. The public health decision making made possible by the exposure investigations affected approximately 41,500 people. Following are representative examples.

Fletcher's Paint and Storage Facility, Milford, New Hampshire

EPA investigators sampled residential surface soil and indoor dust near the Fletcher's Paint and Storage Facility in Milford, New Hampshire. An exposure investigation collaboratively conducted by the New Hampshire Department of Health and Human Services and ATSDR evaluated the highest-risk residents' recent and past exposure to polychlorinated biphenyls (PCBs). None of the serum PCB levels of the 10 participating residents was elevated. These results helped reassure residents that they did not need to be concerned about exposure or to leave their homes. The results also allowed EPA to focus its remediation plan on minimizing future exposure.

Tar Creek Site, Ottawa County, Oklahoma

At the Tar Creek Site in Ottawa County, Oklahoma, an exposure investigation involved extensive environmental sampling in the homes of nine children who had elevated blood lead levels ranging from 15 to 27 micrograms per deciliter. The environmental sampling identified potential sources of lead in the homes, including paint containing lead. ATSDR also provided technical support and resources to help state environmental and health agencies offer blood lead screening to the more than

2,700 children in the county. Public health officials used the results to determine corrective actions to decrease exposure to environmental contaminants. The Tar Creek exposure investigation also influenced the Cherokee Nation Environmental Health Services to remediate lead-contaminated homes.

2

Division of Toxicology

Identification and Ranking of Hazardous Substances

The ATSDR/EPA Priority List of Hazardous Substances, a list of 275 substances found at U.S. Environmental Protection Agency National Priorities List (NPL) sites and believed to be most hazardous to human health, helps form ATSDR priorities on many issues. The Priority List is drawn from the list of all hazardous substances known to exist at NPL sites. To ensure that the most hazardous substances are on the priority list, each year the agency reexamines all hazardous substances at NPL sites as documented in ATSDR's database of information on hazardous substances and health effects, HazDat. The list is reexamined annually because new sites are routinely added to the NPL, new data about how people might be exposed become available as public health assessments are completed, and important new toxicity information about a substance may become available.

In FY 1995, ATSDR initiated the revision of the algorithm for its priority list selection. The revised algorithm will help ensure that proper consideration is given to substances for which new exposure data have been collected by the agency during the conduct of public health assessments.

ATSDR also is developing a priority list of hazardous substances found at Department of Energy (DOE) sites. This list, which is similar to the existing Priority List of Hazardous Substances, will help DOE rank the importance of substances that are candidates for toxicological profiles. In FY 1995, data collection begun in FY 1994 was completed; relevant information was compiled into 19,000 contaminant records for 22 sites and entered into HazDat. The data received a quality assurance audit and were analyzed; they were then used to construct a DOE priority list report document. A review of the report document was completed in FY 1995.

Preparation of Toxicological Profiles

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund), as amended, requires ATSDR to prepare toxicological profiles that examine each hazardous substance on the ATSDR/EPA Priority List. These profiles summarize the literature and interpret available toxicology and epidemiology information to determine levels of significant human exposure for the substance.

ATSDR is also required to provide toxicological profiles at the request of the Department of Defense (DOD). DOD provides ATSDR with a list of the most common, unregulated hazardous substances found at facilities under the jurisdiction of the Secretary of Defense. This allows the agency to profile unregulated hazardous substances not covered under the CERCLA mandate.

ATSDR's toxicological profiles, which provide a review and analysis of information on the health risks of a substance, are used by health professionals as an authoritative source of up-to-date information on the health effects of hazardous waste components and as a credible source of health guidance values for estimating potential human health risk that may result from exposure to toxic substances.

The toxicological profiles are also used to educate the public about potentially hazardous substances. Each profile begins with a public health statement written for a lay audience. Comprehensive literature searches, peer review by scientists familiar with the chemical, and reviews by other federal agencies ensure that the profiles are an extensive and accurate presentation of the literature on the potential health impact of exposure to the profiled chemical. To date, more than 1 million toxicological profiles have been distributed.

During FY 1995, ATSDR personnel developed or revised 59 draft or final versions of toxicological profiles. These profiles covered CERCLA substances and non-CERCLA substances identified by DOD and DOE. (See Appendix B for a complete list of toxicological profiles available.)

CERCLA

In FY 1995, 11 toxicological profiles were released in final form. Another 10 toxicological profiles underwent public review in FY 1995 and were updated to incorporate relevant information identified during the review process. Those profiles will be made final in FY 1996. Eleven toxicological profiles were drafted during FY 1995 and will be distributed for a 90-day public comment period in FY 1996. The FY 1995 CERCLA profiles are listed below.

Final	Public Comment Drafts	Under Development
Asbestos	Carbon Disulfide	Benzene
Benzidine	Creosote/Coal Tars	Chlorfenvinphos
Dinitrocresols	Diazinon	Chloroform
Dinitrophenols	1,2-Dichloroethene	Chloropyrifos
Disulfoton	Endrin/Endrin Aldehyde	Cyanide
Mirex/Chlordecone	Hexachlorobenzene	Dichlorvos
Naphthalene/Methyl Naphthalene	Methyl t-butyl ether	Nickel
Polycyclic Aromatic Hydrocarbons (PAHs)	Selenium	Polychlorinated Biphenyls
Polybrominated Biphenyls (PBBs)	1,1,2,2-Tetrachloroethane	Tetrachloroethylene
Total Xylenes	Toxaphene	Trichloroethylene
1,1,1-Trichloroethane		Vinyl Chloride

Department of Defense

Final toxicological profiles for 10 hazardous substances proposed by the DOD were published, and public comment drafts of another 9 profiles for substances proposed by DOD were made available in FY 1995. Six new DOD profiles were

begun in FY 1995; they will be available for public comment in FY 1996. The DOD profiles are listed below.

Final	Public Comment Drafts	Under Development
Automotive Gasoline	Di-n-octylphthalate	2-Butoxy Ethanol
Diethyl Phthalate	Ethylene and Propylene Glycol	DIMP
1,3-Dinitrobenzene/ 1,3,5-Trinitrobenzene	Hexachloroethane HMX	Hexamethylene Diisocyanate JP-5, JP-8
Fuel Oils	Hydraulic Fluids	Methylene-di-aniline
Jet Fuels (JP-4, JP-7)	Hydrazines	Total Petroleum
Otto Fuel II	Mineral-based Crankcase Oil	Hydrocarbons
RDX	Titanium Tetrachloride	
Stoddard Solvent	White Phosphorus	
Tetryl		
2,4,6-Trinitrotoluene		

Department of Energy

Two new profiles, Ionizing Radiation and Uranium (including depleted uranium), were under development for DOE in FY 1995; both will receive public comment in FY 1996.

Expanded Distribution of Toxicological Profiles

During FY 1995, the public health statements from 80 of the toxicological profiles were placed on the Internet to increase public access to profile material. These Internet entries include full text with figures and tables and full text search and retrieval capacity. The statements can be accessed via the World Wide Web through the following address:

<http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html>

Fact sheets containing material drawn from the public health statements have also been developed and are available at the same Internet address; 40 fact sheets were completed in FY 1995.

The toxicological profiles are now also available on compact disk read-only memory (CD-ROM). In FY 1994, a Cooperative Research and Development Agreement was developed with Lewis Publishers, Boca Raton, Florida, to produce a CD-ROM version of the toxicological profiles to enhance their use by public health officials, staff of poison control centers, researchers, and others who want easy access to the information in the documents. In FY 1995, the conversion of the toxicological profile data to CD-ROM was begun. Users of the CD-ROM version of the profiles, which are expected to be complete in FY 1996, will be able to search issues of interest by key words within and across toxicological profiles.

Minimal Risk Levels

To assist and guide health assessors evaluating contaminants of concern at hazardous waste sites, ATSDR derives minimal risk levels (MRLs) for oral and inhalation

routes of exposure to hazardous substances for acute (1-14 days), intermediate (15-364 days), and chronic (365 days or longer) durations of exposure. An MRL is an estimate of daily human exposure to a substance that is likely to be without an appreciable risk of adverse health effects, other than cancer, over a specified duration of exposure.

MRLs are advisories for physicians and public health officials to consider when making recommendations to protect people living near hazardous waste sites or exposed to chemical emissions or releases. Besides serving as guidelines for levels of acceptable exposure, MRLs are used as screening levels by ATSDR and other public health assessors to identify contaminants of health concern at Superfund and other hazardous waste sites.

In FY 1995, an interagency workgroup comprising representatives of ATSDR and other federal agencies evaluated the available data and recommended 42 oral MRLs and 29 inhalation MRLs based upon information cited in the agency's toxicological profiles.

As part of an ongoing effort to enhance the scientific validity and defensibility of MRLs, to reduce the uncertainties inherent in reference value development and health hazard assessment, and to more reliably define the applications of MRLs, the agency in FY 1995 embarked on a project to compare health guidance values for substances with MRLs with reference values derived using the same database, but utilizing other methodologic approaches to MRL derivation.

The intent of this effort is to compare the values determined using alternative approaches with values derived using the traditional no-observed-adverse-effect level (NOAEL) and lowest-observed-adverse-effect level (LOAEL) approach. One such alternative approach is the benchmark dose method, which mathematically models the dose of a substance that corresponds to a preselected incidence (for example, 10%, 5%, 1%) of a health response among exposed individuals. In FY 1995, this benchmark dose approach was used to compare benchmark-based MRLs with existing MRLs for inorganic mercury; similar comparisons for three more chemicals or substances are scheduled for FY 1996. A computational toxicology laboratory will be added in FY 1996, allowing comparisons to be made inhouse using a variety of methodologic approaches.

Identification of Priority Data Needs

Identification of significant data deficiencies in some areas in ATSDR's toxicological profiles and experience gained in the development of public health assessments indicate that additional information is needed on exposure to, and toxicity of, hazardous substances to better enable the agency to assess potential human health effects. The ranking of hazardous substances and the filling of key data gaps for the substances are mandated by the Superfund Amendments and Reauthorization Act of 1986. These data needs are being met through a research program encompassing EPA test rule development, private sector voluntarism, and activities funded through CERCLA.

38 Priority Hazardous Substances
aldrin/dieldrin
arsenic
benzene
beryllium
cadmium
carbon tetrachloride
chloroethane
chloroform
chromium
cyanide
p,p'-DDT,DDE,DDD
di(2-ethylhexyl) phthalate
lead
mercury
methylene chloride
nickel
polychlorinated biphenyl compounds
polycyclic aromatic hydrocarbons (15)
selenium
tetrachloroethylene
toluene
trichloroethylene
vinyl chloride
zinc

Priority Data Needs/Research Agenda	
Chlordane	1,2-Dibromo-3-chloropropane
Di-n-butylphthalate	Disulfoton
Endosulfan	Endrin
Heptachlor	Hexachlorobutadiene
Hexachlorocyclohexane	Manganese
Methoxychlor	Toxaphene

ATSDR and EPA have used information collected and evaluated in the ATSDR toxicological profiles to rank 275 hazardous substances released from hazardous waste and other sites on the NPL. In FY 1993, ATSDR identified from this list 117 priority data needs for 38 priority hazardous substances (57 FR 54150). These priority substances are the focus of ongoing research (see box to left).

In FY 1995, ATSDR pursued the development of priority data needs documents for another 12 substances (see box above) that were added to the agency's research agenda late in FY 1994 (the total number of priority hazardous substances is now 50). Those priority data needs documents will be available for public comment in the first quarter of FY 1996. Following a 90-day public comment period, the documents will be made final and a research agenda proposed.

Implementation of a Substance-Specific Applied Research Program

ATSDR is working to determine the relationships between identified adverse human health outcomes and

hazardous substances through an applied research program. CERCLA, Section 104(i)(5) requires that for each hazardous substance listed, the administrator of ATSDR, in consultation with the administrator of EPA and other agencies and programs of the Public Health Service, shall assess whether adequate information on the health effects of the substance is available. Furthermore, the law requires that for any such substance for which adequate information is not available or under development, the administrator of ATSDR, in cooperation with the director of the National Toxicology Program, shall ensure the initiation of a program of research designed to determine the health effects of that substance. In compliance with this requirement, ATSDR has initiated the Substance-Specific Applied Research Program (SSARP).

The program provides public health officials with sound scientific data on the effects of chemical exposures on the human body. A major objective of the program is to establish linkages between levels of contaminants in the environment and levels

in human tissue and organs associated with adverse health effects. Once such links have been established, strategies to mitigate potentially harmful exposures can be developed. ATSDR's applied research plan heavily emphasizes the collection of human data to validate the substance-specific exposure and toxicity findings of animal and human studies that are currently open to interpretation.

Following are details of the mechanisms ATSDR used in FY 1995 to address the priority data needs identified in the SSARP.

Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

To develop and implement the research program, ATSDR, the National Institute for Environmental Health Sciences (NIEHS), and EPA established procedures to identify priority data needs of mutual interest to federal programs. These data needs will be filled through a program of toxicologic testing under TSCA or FIFRA; the research will be conducted according to established TSCA and FIFRA procedures and guidelines.

During FY 1993, a subset of about 60 of the 117 priority data needs for the 38 priority substances was referred to EPA for rulemaking under its authorities following review and endorsement by the oversight committee of the Triagency Superfund Applied Research Committee (TASARC). In August 1995, the TASARC oversight committee met to make a final determination concerning which of the 26 data needs EPA would first address. Drafting of the proposal for test rule will begin in the first quarter of FY 1996; the test rule for the data needs is projected to be completed by the end of FY 1996.

Private Sector Voluntarism

In FY 1995, ATSDR pursued voluntary research interests with three private sector organizations: the General Electric (GE) Company, the Halogenated Solvents Industry Alliance (HSIA), and the Chemical Manufacturers Association (CMA). The agency was also in preliminary discussions with the Shell Oil Company. Through the voluntary research efforts of these organizations, as many as 13 data needs for two groups of substances (polychlorinated biphenyls [PCBs] and volatile organic compounds [VOCs]) are being or have been addressed; the agency expects to enter into a memorandum of understanding (MOU) with CMA during early FY 1996 to address data needs for vinyl chloride.

During FY 1995, ATSDR entered into an MOU with GE covering three studies, representing the first time a private sector organization has volunteered to conduct research to address data needs identified in ATSDR's substance-specific applied research program. An MOU was also entered into with HSIA to address three priority data needs for the VOC methylene chloride; the MOU provides for research to address acute, subchronic, and developmental toxicity via oral exposure through the use of physiologically based pharmacokinetic (PBPK) modeling. Expansion of the existing MOU with HSIA to include research on the VOCs trichloroethylene and tetrachloroethylene is planned for FY 1996.

Also in FY 1995, the CMA submitted a study protocol for a study of vinyl chloride entitled "Combined inhalation two-generation reproduction and developmental toxicity study in CD rats." This study protocol has been reviewed by ATSDR-appointed external peer reviewers; pending satisfactory response to the peer review comments and agreement with the study plan, an MOU will be signed with CMA in FY 1996 to conduct this research.

Minority Health Professions Foundation Research Program

During FY 1992, ATSDR announced a \$4 million cooperative agreement with the Minority Health Professions Foundation (MHPF), a not-for-profit organization representing 11 historically black colleges and universities, to support substance-specific investigations. The primary mission of the MHPF is to research persistent health problems that disproportionately plague poor and minority citizens. These efforts include the training of environmental health professionals from minority and disadvantaged backgrounds. The purposes of the ATSDR-MHPF cooperative agreement are (1) to initiate research to fill ATSDR's identified data needs for priority hazardous substances and (2) to enhance existing capacities to conduct research in environmental health at MHPF member institutions. The MHPF has appointed a national advisory board consisting of four national experts in various fields of toxicologic or environmental health research. Approximately \$4 million was allocated annually in FYs 1993-1995 to continue this research program, which concludes in September 1997. (See Appendix C for a list of MHPF institutions receiving awards and their respective studies.)

Research at the MHPF institutions focuses on broad areas of toxicology and environmental health science. Some MHPF member institutions are conducting health studies of minority groups exposed to hazardous substances. As of FY 1995, the schools have obtained the scientific equipment and the extra staff members needed to conduct these investigations. Several institutions have taken steps to include courses in environmental health in their curricula at both the graduate and undergraduate levels.

At the end of FY 1995, 9 (of the 117) priority data needs addressing 21 (of the 38) priority hazardous substances in the ATSDR Substance-Specific Applied Research Program were being addressed through the MHPF program. These research efforts were announced in the March 10, 1994, *Federal Register* (59 FR 11434).

To date, 32 abstracts and 14 manuscripts have been prepared concerning the research conducted under this program (see Appendix D); all results are considered preliminary at this point. In addition to the ongoing research, the MHPF research program will address 13 other substance-specific data needs identified in the ATSDR toxicological profiles concerning exposures and related health effects.

On May 2, 1995, the Office of Management and Budget approved the agency's application to begin epidemiologic studies of select cohorts of urban populations potentially exposed to lead in the environment. These studies will assess lead body burdens and also examine the effects of lead on hypertension and the developing central nervous system.

National Toxicology Program

Since 1986, ATSDR has maintained an interagency agreement (IAG) with the National Toxicology Program (NTP) to study the toxicology of substances identified at NPL sites. Through this mechanism, ATSDR has funded research and testing efforts for various environmental substances.

During FY 1995, 10 Superfund-related chemicals were undergoing testing under this program. The emphasis of the IAG has recently shifted to the development of modeling and computational approaches that will allow ATSDR to characterize, define, and estimate levels of toxic substances that might pose a threat to public health. This year's activities were focused on establishing procedures and protocols for limited in vivo and in vitro studies using innovative approaches and techniques. Specific activities included functional toxicology studies to screen priority hazardous substances for their dioxin-like and estrogen-like effects, and the application of structure-activity relationships and PBPK modeling to estimate the toxicity of selected substances. These efforts contribute to the development of an overall framework that will strengthen ATSDR's ability to assess significant human exposures to hazardous substances found in the environment.

Great Lakes Human Health Effects Research Program

In FY 1992, ATSDR announced a \$2 million grant program to conduct research on the impact on human health of eating fish from the Great Lakes region in support of the Great Lakes Critical Programs Act of 1990. ATSDR initially awarded funds to nine institutions; ATSDR funding was subsequently increased to \$3 million in FYs 1993 and 1994. In continuing support of this program, Congress authorized funds not to exceed \$5 million for each of the fiscal years 1995, 1996, and 1997.

In FY 1995, ATSDR received \$4 million to support its current research efforts investigating the potential for adverse human health effects from consumption of contaminated fish. These funds were awarded to 10 investigators. (See Appendix E for a list of the institutions currently receiving awards and their respective studies.)

Research undertaken through this program is intended to build on and amplify the results of past and ongoing fish consumption research in the Great Lakes basin, using existing structures and institutions already involved in human health research. The ATSDR-supported research projects focus on known high-risk populations to further define the human health consequences of exposure to persistently toxic substances identified in the Great Lakes area. Twelve priority data needs identified in SSARP are currently being addressed through this program. Research activities include, but are not limited to, the following:

- characterizing exposure and determining the profiles and levels of Great Lakes contaminants in the biologic tissues and fluids of high-risk populations;
- identifying sensitive and specific human reproductive or developmental end points and correlating them with exposure to Great Lakes contaminants;

- determining the short- and long-term risk(s) of adverse health effects in the children of men and women exposed to Great Lakes contaminants;
- investigating the feasibility of establishing registries and surveillance cohorts in the Great Lakes region; and
- establishing a chemical mixtures database with emphasis on tissue and blood levels to identify new cohorts, conduct surveillance and health effects studies, and establish registries and surveillance.

In FY 1995, nine abstracts describing research under this program were published for presentation at professional conferences and symposia:

Lonky E., J. Reihman, T. Darvil, J. Mather, and H. Daly. 1995. *Behavioral Effects in Neonates of Maternal Consumption of Lake Ontario Fish*. Society for Research in Child Development. Indianapolis, IN. March 30, 1995.

Lonky E., J. Reihman, T. Darvil, J. Mather, and H. Daly. 1995. *Mothers' Consumption of Lake Ontario Fish; Effects on Behavioral and Physical Measures in Newborns*. International Association for Great Lakes Research. Lansing MI. May 29, 1995.

Stinson C. J., H. B. Greizerstein, J. Vena, and P. J. Kostyniak. 1995. *Congener-Specific Profiles of PCBs and Several Chlorinated Pesticides in Human Milk*. Great Lakes Research Consortium Conference, Syracuse, NY. January 1995.

Buck G. M., L. E. Sever, P. Mendola, J. E. Vena, and M. Zielezny. 1995. *Resolved and Unresolved Infecundity and Consumption of PCB-Contaminated Fresh Water Fish*. Society for Pediatric Epidemiologic Research, Snowbird, UT. June 20-24, 1995.

Mendola P., G. M. Buck, L. E. Sever, J. E. Vena, and M. Zielezny. 1995. *Consumption of PCB-Contaminated Fresh Water Fish and Shortened Menstrual Cycle*. Society for Pediatric Epidemiologic Research, Snowbird, UT. June 20-24, 1995.

Buck G. M., L. E. Sever, P. Mendola, and J. E. Vena. 1995. *Consumption of PCB-Contaminated Fresh Water Fish and Risk of Delayed Conception*. International Society for Environmental Epidemiology - International Society for Exposure Analysis. Noordwijkerhout, The Netherlands. August 30 - September 1, 1995.

Mendola P., G. M. Buck, L. E. Sever, and J. E. Vena. 1995. *Infecundity and PCB-Contaminated Fresh Water Fish Consumption*. International Society for Environmental Epidemiology-International Society for Exposure Analysis. Noordwijkerhout, The Netherlands. August 30-September 1, 1995.

Vena, J. E., P. Kostyniak, H. Greizerstein, J. McReynolds, J. Olson, M. Zielezny, J. Freudenheim, G. Buck, P. Mendola, M. Swanson, and E. Fitzgerald. 1995. *Pesticide and Congener-Specific PCB Exposure and Consumption of Contaminated Sport Fish*. International Society for Environmental Epidemiology - International Society for Exposure Analysis. Noordwijkerhout, The Netherlands. August 30 - September 1, 1995.

Falk C., H. Anderson L. Hanrahan, T. Long, G. Steele, H. Humphrey, and K. Mortensen. 1995. *Distribution of Persistent Environmental Contaminants among Consumers of Great Lakes Sport Fish*. Wisconsin Epidemiologic Research Symposium. Madison, WI. March 20, 1995.

The program also includes a grant to the Michigan Department of Public Health to design, establish, and operate a professionally creditable interlaboratory quality assurance and quality control program for the ATSDR Great Lakes Program.

In response to the Great Lakes Critical Programs Act of 1990, ATSDR submitted to EPA in late FY 1994 a report on its Great Lakes Human Health Effects Research Program; the report summarized the research progress made by the program since FY 1992. Availability of the report for public comment was published in the *Federal Register* (57 FR 35367). The 3-year project period for grants awarded in 1992 concluded in September 1995. Final results and conclusions are expected in FY 1996.

Preliminary findings of ATSDR's Great Lakes Human Health Research Program to date have shown that Native Americans and the urban poor who consume large amounts of fish from contaminated waters have elevated levels of methyl mercury, PCBs, DDT, and DDE in their bodies.

Chemical-Specific Health Consultations

During FY 1995, 6 substantive health consultations were completed; these single-chemical consultations are briefly described below.

- **1,4-Dioxane:** The state of Michigan requested assistance in evaluating the potential health impact of human exposure to 1,4-dioxane, a controversial waste site contaminant for which there is little toxicologic information and no federal or state health guidance values. This consultation was instrumental in Michigan's determination of potential health impacts of exposure to this chemical and in making decisions on site-specific clean-up activities.
- **Methyl Parathion:** ATSDR was asked by the Lorain County (Ohio) health department to provide assistance in reviewing proposed clean-up criteria and in determining appropriate health-based relocation criteria for residents in an area in which more than 200 residences were reportedly sprayed with the pesticide methyl parathion by an unlicensed applicator. ATSDR's recommendations for health protection, inhouse sampling, and mitigation of the contamination were relied upon for relocation and clean-up decisions.
- **Methyl Parathion:** A private citizen in Elyria, Ohio, whose home had been sprayed liberally with methyl parathion requested assistance in determining the extent of health risk to her family. The toxicomedical information, the exposure minimization suggestions, and the clean-up recommendations resulted in the citizen taking appropriate steps to monitor and safeguard the health of her family.
- **Silica Gel:** A resident of Long Beach, California, whose badly deteriorating ventilation system was thickly coated with silica gel requested assistance in

determining whether the disintegrating lining represented a health threat and what measures needed to be taken to protect the health of her family. The information provided by ATSDR evaluated the nature of the risk; recommendations to minimize unnecessary exposure during home repairs were reportedly followed.

- **Tert-butyl Alcohol:** EPA Region I requested information on the appropriate methods of, and the immediate health risks associated with, disposal of two 25-year-old drums of t-butyl alcohol. The information and recommendations provided by ATSDR resulted in a change in the originally planned method of disposal to protect worker and public health.
- **Organic Mercury Compounds:** A professor at the University of Brescia, Italy, Institute of Occupational Health requested assistance in identifying uses of organic mercury compounds that might result in significant human exposure. Both historical and current usage information was provided, along with information delineating the health effects associated with exposure to various organic mercury compounds.

Emergency Response

ATSDR takes information acquired through listing hazardous substances, preparing toxicological profiles, and conducting research and, upon request, applies it to real-life emergency incidents involving hazardous substances. This includes activities ranging from providing on-scene support to developing time-critical health consultations.

The agency provides technical assistance to federal, state, and local government and emergency organizations during emergency situations resulting from the unplanned release of hazardous substances. Emergency response coordinators have immediate access to expert assistance in the areas of chemistry, toxicology, medicine, environmental science, and engineering. ATSDR staff members experienced in providing emergency assistance are on call 24 hours a day, and site-specific consultation teams are convened, usually within 20 minutes, to provide support. On-site response can be provided anywhere in the continental United States, usually within 8 hours of a request.

At the request of EPA regional offices, other federal organizations, and state and local agencies, ATSDR emergency response personnel made 5 on-site responses during FY 1995, and responded to another 59 requests for site-specific information related to acute exposures to environmental toxicants. The acute release incidences represented a 10% increase over the number reported in the previous fiscal year.

During these emergencies, ATSDR assisted first responders in addressing the public health needs of about 647 people (from 1 to 432 per event) who may have been injured as a result of those acute events and another 31,629 people who were estimated to be potentially affected.

Requests for emergency response typically involve the following types of information:

- evaluation of the health implications of spills, including identification of potentially exposed populations, consideration of climatological and weather impacts, and recommendations for evacuation when appropriate (34% of all requests);
- in cases of fires or explosions, information about combustible by-products and action levels for protection of potentially exposed workers and the surrounding population (25%); and
- recommendations for medical treatment and identification of toxicologic effects and clinical signs and symptoms of exposure (usually acute) to hazardous substances (22% of all requests);
- other worker health and safety issues, including health risk identification and recommendations for protective clothing (10%).

Some of the more widely recognized response incidents in FY 1995 were these:

- **Storage tank fire at the Powell Duffryn Terminal in Savannah, Georgia**—at the request of the U.S. Coast Guard captain of the port, provided public health expertise and support, met with hospital personnel receiving persons with injuries, coordinated public health activities with other government responders, and provided ambient air action levels to prevent harmful exposures of citizens.
- **Burning toluene barge in the inner harbor of Corpus Christi, Texas**—provided action levels to the U.S. Coast Guard on-scene coordinator to assist in evaluating the need for evacuation or other protective measures in the business district.
- **Requested site visit to the bombed Murrah Federal Office Building in Oklahoma City, Oklahoma**—provided advice on biologic and chemical hazards, appropriate use of personal protective equipment, and related safety issues; participated as part of a response team comprising personnel from the Centers for Disease Control and Prevention (CDC) Office of Health and Safety and Emergency Response and Coordination Group, the National Institute for Occupational Safety and Health, and ATSDR's Emergency Response Section.
- **Leaking pesticides in a storage shed at the Territorial Health Clinic in St. Croix, U.S. Virgin Islands**—provided on-scene assistance, including technical and public information about materials of concern, and a health consultation developed in association with the CDC National Center for Environmental Health.

- **CSX train derailment in Flomaton, Alabama**—provided on-site support during the removal of a derailed and damaged vinyl chloride tank car, advice concerning worker health and safety, liaison with the local medical community, and technical support in identifying the potential chemical and physical hazards of the spilled compound.
- **Fire and explosions in the Houston ship channel and the San Jacinto River, Texas**, which resulted from the flood-related rupture of several gasoline pipelines and subsequent release of more than 500,000 gallons of fuel—at the request of the Coast Guard, evaluated the contents of chemical barges threatened by the fire to determine the potential combustion products of their cargos and any potential health threat from smoke if these materials were to catch fire, and evaluated soil sediment data from samples collected by EPA.

The majority of requests for information during acute releases were from the federal on-scene coordinator (EPA and U.S. Coast Guard combined: 29%). The single most common requesters were the EPA on-scene coordinator and local agencies (25%). Most of the requests involved releases to the air, both indoor and ambient (73%), and surface water (12%) in an urban or rural residential environment (44%). ATSDR also assisted EPA and local responders in identifying response options to protect public health. (See Appendix F for a complete list of ATSDR assistance provided in FY 1995 acute release incidents.)

For situations other than acute releases, physicians and hospitals were the most frequent requesters of time-critical support (28%); local agencies were the second most frequent requesters (19%).

ATSDR is also significantly involved in preparedness for and prevention of emergency events. Approximately three-fourths of all the work of the emergency response personnel is in these areas. The agency's guidance document for emergency response activities, the ATSDR integrated emergency response management plan, was revised and submitted for review in FY 1995. Emergency response personnel also responded to approximately 200 requests per quarter for the agency's guidance documents for managing chemically contaminated patients.

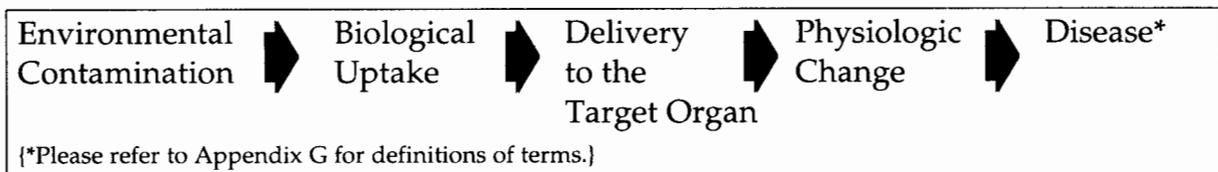
A set of 10 medical management guidelines (arsenic, creosote, ethylene glycol, halons, mercury, nitric and sulfuric acid, methyl and ethyl parathion, sulfur dioxide, tetrachloroethylene, and trichloroethane) was developed in FY 1995; the guidelines will be peer reviewed in early FY 1996.

3

Division of Health Studies

Evaluating the Relationship Between Exposure and Adverse Health Effects

The Division of Health Studies has conducted and supported health studies to evaluate the relationship between exposure to hazardous substances and adverse health effects. This relationship can be described as a sequence of events leading from the contamination in the environment to, possibly, the presence of illness of exposed persons.



Illness does not result only from the presence of hazardous substances in the environment; rather, it may develop when material is taken into the body, it or its metabolite is delivered to the location of its toxic effect, and it is present at a sufficient concentration to create a harmful change and later develop into a recognizable clinical entity that a physician would diagnose as a disease. Therefore, to fulfill its public health mandates, ATSDR aims to identify the relationship between these factors, identify how the process may be prevented, and intervene before the development of a disease or harmful physiologic process.

To evaluate illnesses among persons living near hazardous waste sites, ATSDR reviewed the medical and toxicological literature to determine which illnesses and conditions were most common. As a result of the review, ATSDR selected seven priority health conditions as the most important for evaluating populations living near hazardous waste sites, for identifying areas of investigation needed to assess the association between adverse health outcomes and exposures to hazardous substances, and for determining the strategies the agency will use to address them.¹

ATSDR evaluates the priority health conditions (see following alphabetical list) in populations living or working near hazardous waste sites using the model described previously.

- | | |
|--|-------------------------------|
| Birth defects and reproductive disorders | Liver dysfunction |
| Cancer (selected anatomic sites) | Lung and respiratory diseases |
| Immune function disorders | Neurotoxic disorders |
| Kidney dysfunction | |

¹ATSDR. Priority health conditions: an integrated strategy to evaluate the relationship between illness and exposure to hazardous substances. Atlanta: U.S. Department of Health and Human Services, Public Health Service, July 1993.

Summary of FY 1995 Health Study Findings by Priority Health Condition

Birth Defects and Reproductive Disorders

In FY 1995, two ATSDR-supported studies were completed that evaluated relationships between birth outcomes and potential exposures to hazardous waste sites. Both studies followed up the findings of previous investigations, but utilized a more precise determination of the potential exposures.

New York Birth Defects Study

The New York State Department of Health conducted a study of central nervous system defects and musculoskeletal system defects using the New York birth defects registry. This follow-up study further evaluated the findings of Geschwind et al in 1992 that mothers living within a mile of hazardous waste sites in New York were more likely to give birth to children with malformations than mothers living farther away. The Geschwind study also found associations between central nervous system defects and potential solvent exposure, and musculoskeletal defects and potential pesticide exposure. The 1995 study found excesses, although not statistically significant, in both types of defects in mothers living less than a mile from toxic waste sites.

Lipari Landfill, Pitman, New Jersey

The New Jersey Department of Health followed up a 1989 study of birthweight in the vicinity of the Lipari Landfill in Pitman, Gloucester County, New Jersey. The earlier study found that during the period when inhalation exposures to contaminants from the site would have been the highest, children born to mothers living within 1 kilometer of the landfill were twice as likely to have low birth weight for their gestational age as children born to mothers living farther away. The 1995 study focused on births to mothers residing immediately adjacent to the site and found a fivefold excess during the same period. Virtually all of the excess found in the 1989 study was from the exposures in mothers living immediately adjacent to the site. An initial report of this study was published in FY 1994 by the New Jersey Department of Health. In FY 1995, the ATSDR peer review process was completed for this study, and an article for publication in the peer-reviewed literature was drafted.

Cancer of Selected Anatomic Sites

The goal of studies evaluating cancer as an endpoint is to determine if the incidence of cancer in persons potentially exposed to hazardous waste from National Priorities List (NPL) sites, landfills, and state-designated sites is the same or differs from the cancer incidence in persons not exposed. ATSDR is currently studying cancers of the bladder, brain, kidney, liver, lung, pancreas, and stomach, as well as leukemia and non-Hodgkin's lymphoma. Several study designs are being used. In FY 1995, ATSDR completed two studies that evaluated cancer.

Hazardous Waste Sites and Cancer Incidence in New York State

The goal of this project was to develop and evaluate a proactive method of identifying communities with potentially elevated cancer risks because of the presence

nearby of inactive hazardous waste sites. Communities for study were selected on the basis of measures on a health index and an exposure potential index. The health index used was a combined average annual age-adjusted cancer incidence rate (kidney, bladder, non-Hodgkin's lymphoma, and leukemia) for the period 1978 to 1982. All New York State counties, excluding New York City, were ranked and grouped into quartiles on the basis of the combined cancer rate. Hazardous waste sites were also ranked and grouped into quartiles according to their respective exposure potential.

The two indexes were cross-referenced; hazardous waste sites were identified in the following strata: 1) *high* exposure potential and located in counties with *high* incidence, 2) *high* exposure potential and located in counties with *low* incidence, and 3) *low* exposure potential and located in counties with *high* incidence. Three hazardous waste sites were randomly selected from each stratum; a cancer incidence investigation was then conducted for each area. Results of the cancer incidence investigations for the three study areas in each exposure/incidence stratum were combined. These results were qualitatively examined in relation to what would be expected based on the stratum in which they occurred.

None of the exposure and incidence strata displayed evidence of elevated cancer incidence rates when the results were combined, or when study areas were examined individually. The relatively minor differences in cancer patterns among strata suggest that the algorithm was not sensitive enough to proactively identify communities likely to have elevated cancer incidence. Suggestions for improvement of the methodology were developed.

Arizona Lung Cancer Study

A population-based case-control study was conducted in four Arizona copper smelter towns (Ajo, Clifton/Morenci, Douglas, and San Manuel) to investigate factors related to lung cancer mortality. This study parallels an ongoing case-control study in several Gila Basin, Arizona, smelter towns where lung cancer mortality rates are 50% higher than rates in the Phoenix/Tucson metropolitan areas.

From Arizona state mortality files, 142 cases were identified as residents of the four towns who died from lung cancer during the period 1979 to 1990. For each case, two controls were selected randomly (excluding deaths from respiratory system and skin cancer); the groups were matched on year of death and age at death. Attempts were made to contact a knowledgeable respondent for each person who died and to administer a blind, structured telephone interview that sought detailed information on lifetime residential, occupational, and cigarette smoking history. Interview data were collected on 80.3% of the cases and 73.9% of the targeted number of controls.

Atmospheric diffusion modeling of data on smelter SO₂ (as a surrogate for smelter emissions) and local aerometric/topographic parameters was performed to estimate past environmental exposures in the four towns. Exposure estimates were linked with residential histories to derive individual profiles of community exposure; occupational histories were characterized by potential exposures to smelter

emissions, asbestos, solvents, gasoline, and radiation. Conditional logistic regression analysis was used to compare study factors in cases and controls; potential confounding factors were controlled for.

This study provided little evidence of an association between lung cancer and any of the indicators of residential exposure to smelter emissions considered. Statistically significant associations were observed between lung cancer risk and reported employment in copper mines, copper smelters, or both. These jobs entail potential occupational exposure to asbestos and smelter emissions. The occupational findings must be interpreted with caution because of the subjective nature of the classification scheme used to assign potential exposures.

Immune Function Disorders

Tucson International Airport Site

In 1981, several public water wells near the Tucson International Airport Superfund site (TIA) were found to contain trichloroethylene (TCE) at levels greater than the state action level of 5.0 micrograms per liter ($\mu\text{g/L}$); the wells were immediately closed. By 1984, additional wells were closed because TCE levels were found near 5.0 $\mu\text{g/L}$ during routine monitoring. Residents in the area were concerned that their health was being adversely affected by groundwater contamination emanating from the TIA site. In February 1994, ATSDR conducted a cross-sectional, disease- and symptom-prevalence survey to address community health concerns. Survey data were collected from a sample of 350 residents living in an area close to the TIA site (target area) and from 350 residents of a neighborhood 5 miles from the TIA site (comparison area).

Target area residents, aged 18 through 75 years, reported a higher occurrence of most of the symptoms (20 of 25 symptoms) and some diseases (13 of 36 diseases) than comparison area residents. Self-reported symptoms found to be statistically significantly elevated in target area participants involved most of the major organ systems. The two symptoms with the highest odds ratios (ORs) that were reported more frequently by residents of the target area than residents of the comparison area were poor coordination (OR=3.61) and skin rashes (OR=3.34). The three self-reported diseases with the highest odds ratios were skin/eczema (OR=5.06), anxiety/nervousness (OR=3.47), and cancer (OR=3.40). In addition, eight members of the target population stated "yes" when asked if a health care provider had diagnosed "a collagen disease or disease of the immune system like lupus, rheumatoid arthritis?" compared with one case in the comparison population.

Kidney Disorders

End-Stage Renal Disease

In FY 1995, ATSDR released a report of its case-control study to assess the potential associations between end-stage renal disease (ESRD) and the probability of exposure to heavy metals and solvents from hazardous waste sites. Persons (cases) who developed ESRD in 1992 and 1993 were recruited from the records of the

Health Care Financing Administration. Persons without ESRD (controls) were recruited by random-digit dialing and matched to cases on age, sex, and race. The geographic area studied comprised 20 counties in New York State. Information on residence, occupation, and health was collected by administering a questionnaire over the telephone. Residential histories were assessed for potential exposures to hazardous waste sites. First, the latitudes and longitudes of the addresses were determined (based on 1990 Bureau of the Census files) and compared with the locations of sites.

Qualitative measures of exposure to heavy metals and solvents were assigned to each residential address within a 1-mile radius of a site based on a review of available site histories and sampling data. After the exclusion of cases with diabetic, infectious, or congenital end-stage renal disease, 216 case-control pairs were available for analysis. Participants lived in the vicinity of 317 hazardous waste sites. Elevated, but not statistically significant odds ratios showed that cases were more likely than controls to have ever lived within a 1-mile radius of a site and to be more likely to have had a high or medium probability of being exposed to solvents from sites. Information on residence and all potential confounding variables was available for 144 case-control pairs. Results suggest that people living in the vicinity of hazardous waste sites might be at an elevated risk of ESRD, but additional studies are needed to confirm these findings and to determine whether chemicals or other factors explain the excess risk.

Lung and Respiratory Diseases

Ft. Hall Indian Reservation

In FY 1995, ATSDR completed a study of persons exposed to phosphate processing air emissions on the Ft. Hall Reservation in Idaho. This cross-sectional study compared symptom and disease reporting rates and pulmonary function measurements between the reservation community near the plants and a distant Native American group. The study found that the majority of the respiratory symptoms and diseases asked about were reported at higher rates by the participants near the plants. Pulmonary function tests demonstrated decreased air flow. Although none were statistically significantly lower than the control group, all the obstructive signs of reduced forced expiratory flow in the first second and in the mid 50% of the flow time were reduced in the target participants and consistent with reported obstructive symptoms. This finding is consistent with a 1994 study by the Missouri Department of Health and ATSDR, which found that respiratory symptoms were more frequent in target areas, and pulmonary function test results were lower in target areas, suggesting diminished respiratory function.

Study of Effect of Residential Proximity to Waste Incinerators on Lower Respiratory Illness in Children (University of North Carolina)

ATSDR released in FY 1995 its report of a retrospective study of respiratory illness in children living in communities with hazardous waste or municipal waste incinerators. Study subjects were children younger than 8 years who lived in a

hazardous waste incinerator community and a municipal waste incinerator community. Questions about a child's first episode of lower respiratory tract infection (bronchitis, pneumonia, croup, or a chest infection or cold in which mucus or phlegm was coughed up from the chest) were asked in the incinerator communities as well as in two comparison communities. Risk factors such as prematurity, parental smoking, other young children in the household, and day care attendance were also determined. The number of weeks that each child lived in the neighborhood before the occurrence of a first lower respiratory infection were compared for the paired communities. Analysis showed that important risk factors for lower respiratory infection were day care, pre-term birth, exposure to environmental tobacco smoke, and parents' educational level. No differences in the risk for residence were found between the hazardous waste community and its comparison population. However, for children living in the municipal waste incinerator community, the risk of lower respiratory tract infection was about 3 times as high as its comparison community. When the investigators examined the rates in the two communities before the incinerator was built, there was no difference in rates of lower respiratory infection. The results from a 6-month prospective study of lower respiratory infection in these incinerator communities are being analyzed.

With ATSDR support, the University of North Carolina has also initiated a study of the effects of poor air quality on respiratory function. This study will compare the prevalence of respiratory conditions and lung function in three populations exposed to incineration and three control populations. Lung function will be correlated with air monitoring data. Final data collection took place in fall 1994. The preliminary cross-sectional data evaluation does not indicate large differences in pulmonary function results for people living near the incinerator. There was some indication of greater self reporting of lower respiratory infections among children living near the municipal incinerator.

Brio and Dixie Oil Processing Sites, Houston, Texas

Residents of the Southbend subdivision adjacent to the Brio and Dixie Oil Processing sites, Houston, Texas, were concerned about site-related health effects. In response, ATSDR designed and implemented a health outcomes study with biomedical testing for residents; the final report was completed and released in FY 1995. The study included 774 participants from target and comparison areas. Results of the study showed that the target area had a higher prevalence of self-reported symptoms and several illnesses. The prevalence of four self-reported respiratory symptoms was higher in the target area, even after investigators controlled for smoking.

Neurotoxic Disorders

Trichloroethylene Subregistry Baseline Report

Results from the ATSDR Trichloroethylene (TCE) Subregistry Baseline data analyses, released in 1993, suggested that, on the basis of national norms, children exposed to TCE in their drinking water were more likely to experience hearing and speech disorders than children in the general population. Work began in FY 1995 to

further investigate oral motor, speech, and hearing function in the registrants who were less than 10 years of age at baseline.

In the *TCE Subregistry Baseline Technical Report*, it was noted that the greatest number of individuals in the TCE Subregistry sample having speech or hearing impairments were males and females in the 0 through 9 years of age group. Because children of this age could have been exposed in utero to TCE at most of the subregistry sites, as well as following birth, the actual dose received by the children's target tissues would be greater than the dose received by adults. Also, given the same exposures and given that maturation of the central nervous system continues after birth, it is possible that it is during this period that TCE might elicit an effect. When the registrants were grouped by length of exposure to TCE, a statistically significant association was found in the subpopulation younger than 19 years between length of exposure and reported hearing impairments. ATSDR has initiated a study of this TCE Subregistry subpopulation to determine what physical manifestations, if any, contributed to the reported increase in speech or hearing impairments.

Multiple Health Outcomes

Cornhusker Army Ammunition Plant, Nebraska

The Cornhusker Army Ammunition Plant (CAAP) is a Department of Defense facility in Grand Island, Nebraska, that has operated since 1942 under the command of the U.S. Army Armament, Munitions, and Chemical Command (USAMC-COM). Before 1973, the site functioned primarily as a plant for the production of artillery shells, bombs, and rockets. At the time of this study, a large part of the installation was leased to local residents for agricultural activities, business interests, and private storage.

ATSDR conducted a cross-sectional health study to evaluate the general health status of persons who lived in the residential area affected by this groundwater contamination, and to address health concerns of residents. A total of 600 Grand Island residents (target and comparison area) were administered a standardized symptom- and disease-prevalence questionnaire and were asked to provide blood and urine specimens for biomedical tests of subclinical organ dysfunction. A randomly selected subset of these participants aged 16 years or older was administered a battery of neurobehavioral tests designed to evaluate whether neurobehavioral function had been impaired. Seven health outcomes were reported approximately twice as often (odds ratios of 1.7 to 2.2) by target area participants as by comparison area participants: neurologic problems, weakness or paralysis of limbs not caused by stroke, urinary tract disease, numbness or sensation of pins in fingers or toes, trouble sleeping, trouble remembering, and irritated eyes. A longer duration of residence in the target area was not associated with an increased prevalence of self-reported health outcomes. No statistically significant differences in reproductive histories were found between target and comparison area women. Biological test results of the hepatobiliary, renal, immune, and hematopoietic systems revealed no statistically significant differences between target and comparison study groups, nor

any differences between the target population and established reference levels. No statistical differences between target and comparison groups were detected for any of the six functional groups of neurobehavioral tests.

McClellan Air Force Base, Sacramento, California

The McClellan Air Force Base (McAFB) is an aircraft maintenance facility northwest of Sacramento, California. McAFB engaged in a variety of activities involving the use of volatile organic compounds, heavy metals, and other contaminants that have been detected in groundwater, sediment, surface soil, and air. In March and April 1994, ATSDR conducted a well water survey and health study of 453 residents living within 1.5 miles of McAFB. The investigation consisted of questions about self-reported illnesses and biomedical tests, including neurobehavioral tests to evaluate motor and sensory function.

A total of 168 participants (118 in the target community) were administered the ATSDR adult environmental neurobehavioral test battery. There was no difference in the group mean results for 5 of the 6 functional groups (vision, strength, tactile, cognitive, and mood) between the target and comparison area participants. The average simple reaction time (the time taken to push a button in response to a light) was statistically significantly slower among the target area participants.

Calvert City Industrial Complex, Calvert City, Kentucky

At the Calvert City Industrial Complex near Calvert City, Kentucky, residents of Marshall and Livingston counties believed they were suffering from adverse health conditions associated with chemicals used in operations at the BF Goodrich/AIRCO Superfund site. ATSDR conducted a study that, in addition to biomedical testing, tested for volatile organic compounds (VOCs) in a subset of the study participants. In FY 1995, the agency released its report of the results, which were analyzed in FY 1994. The results showed no discernible pattern of increase in self-reported diseases or symptoms in the target population, and no consistent differences in the biomedical tests. VOC exposure test results revealed no recent, excessive chemical exposure in persons living in the target area. (See Appendix H for a summary of ATSDR health studies nearing completion or in progress.)

Studies Evaluating for Exposure Risk Factors

ATSDR continues to support studies that evaluate whether people exposed to hazardous substances in the environment have unusual amounts of these hazardous substances in their bodies. Biological indicators of exposure studies are conducted by testing biological media, such as blood, urine, hair, and other tissues, for the presence of the hazardous substances, their metabolites, or other indicators of exposure. The testing must consider the potential for exposure, the chronologic relationship between the time of exposure and testing, and the toxicokinetics of the substance in the body. The testing provides information about the relationship between the presence of hazardous substances in the environment and biological dose measurements, and also provides a better estimate of exposure for correlation with adverse health effects. The following studies were ongoing or completed in FY 1995.

The RSR Smelter Site, West Dallas, Texas

In FY 1995, the Dallas Department of Health and Human Services with assistance from ATSDR completed a biological indicators of exposure study among children living near the RSR Smelter site in West Dallas, Texas. Since the early 1970s, lead and its associated health hazards have been a concern in the West Dallas, Texas, area where the RSR Smelter operated as a secondary lead smelter from 1936 until 1984. The study evaluated children 6 months through 71 months in the West Dallas area and a comparison group in south Dallas. The study was done to determine if the children had elevated blood lead levels and to identify related environmental exposure factors. Blood samples were collected, and the EPA participated by collecting and analyzing environmental samples. The highest average blood lead levels were found among children living in the high air dispersion area of West Dallas. Children living in the high air dispersion area and the eastern low dispersion area of West Dallas were more likely to have a blood lead level ≥ 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$). Also, living in the high air dispersion area was statistically significantly associated with blood lead levels in the regression model. However, neither levels of dust in homes nor residential yard soil explained the levels of blood lead in the children tested. Children who played outside of their homes or in the neighborhood were more likely to have elevated blood lead levels; children whose homes were air conditioned and whose faces and hands were washed before they ate were more likely to have lower blood lead levels.

Kellogg, Page, Smelterville, Wardner (ID) Annual Lead Testing (1995)

The Silver Valley Health Intervention Program is conducted annually (with ATSDR funding since September 1989) to determine the current blood lead levels of children aged 9 months to 9 years in Kellogg, Page, Smelterville, and Wardner, Idaho. An evaluation of 15 years of testing has been completed and demonstrates a downward trend in blood lead levels over time. The greatest decrease occurred in the years following the closing of the smelter. Because the Bunker Hill site has not been remediated, it is important that blood lead surveillance of children continue throughout remediation. Remediation of the Bunker Hill Hazardous Waste Site could increase the risk of lead exposure in persons who live near the site. The 1995 blood lead screening was conducted in July. A total of 405 children from the Silver Valley, ages 9 months through 9 years, were screened. Results showed 82 (20.2%) children had blood lead levels above 10 $\mu\text{g}/\text{dL}$ and 25 (6.2%) had blood lead levels above 15 $\mu\text{g}/\text{dL}$.

A Case Control Study To Determine Risk Factors for Elevated Blood Lead Levels in Children

The purpose of this study was to generate information that could be used to prevent further increases in blood lead levels among children living in the vicinity of the Bunker Hill, Idaho, site. A case-control study of matched pairs was designed to identify potential risk factors for elevated blood lead levels. The study subjects were selected from the children who participated in the 1992 Silver Valley blood lead screening conducted by the Idaho Department of Health and Welfare (IDHW). The case participants were children whose blood lead levels had been reported at

≥ 10 $\mu\text{g}/\text{dL}$ in the 1992 screening. Control participants were matched to case participants by age and sex, and had blood lead levels reported at <10 $\mu\text{g}/\text{dL}$. Information on risk factors was obtained by personal interviews; environmental data were obtained from the IDHW.

Yard soil remediation proved to be a protective factor for elevated blood lead levels; having pets going in and out of the house was found to be related to an increase in blood lead levels in participating children. Yard soil removal is one of several interventions being conducted in the vicinity of the Bunker Hill site. The results of this study suggested that this intervention has helped decrease blood lead levels in this community.

National Exposure Registry

The ATSDR National Exposure Registry comprises chemical-specific subregistries designed to aid in assessing the long-term health consequences in the general population of low-level, long-term exposures to hazardous chemicals identified at hazardous waste sites. The goals of the National Exposure Registry are to facilitate epidemiologic research, to facilitate state and federal health surveillance programs, and to provide current relevant information to exposed persons. Also, the registry serves an important role in ensuring the uniformity and quality of data collected from different sites.

TCE Subregistry

Trichloroethylene (TCE), the first chemical selected for a subregistry of the National Exposure Registry, is a synthetic substance that does not occur naturally in the environment. By far, the greatest source of TCE in the environment is from factories that use it to remove grease from metals. It can also get into the air and water when it is released from hazardous waste sites.

During an initial or baseline interview, 4,776 people from 13 hazardous waste sites participated in the TCE Subregistry. In FY 1992, the 14th site, Crossley Farm/Hereford Groundwater site, was added. In FY 1994, ATSDR added the 15th site, the Tucson Airport Area, to the subregistry, bringing the total number of registrants to 4,927. Nine of the sites are on the NPL. Statistical analyses of the TCE Subregistry Baseline data were completed in FY 1993, and a technical report containing the results was published in 1994. A subsequent analysis in 1995 of the Followup 1 data (the same information gathered during the baseline interview, but solicited 1 year later by computer-assisted telephone interviews) reinforced the baseline findings. The reporting rates of excess and deficient outcomes in the follow-up interview were in general in keeping with those found during the baseline interviews.

In FY 1995, ATSDR continued updating the registrant information and analysis of that information. This was the fourth update of sites in Michigan and Indiana, the third update of the Illinois site, the second update of the Pennsylvania site, and the first update of the Arizona site. After completing the TCE baseline data analysis, ATSDR released the data, excluding personal identifiers, on compact disk read-only memory (CD-ROM) for use by researchers. About 400 people have requested the CD-ROM version of the data.

TCA Subregistry

Trichloroethane (TCA) is a man-made compound released to the environment as a result of a variety of activities. TCA is used as a solvent for adhesives (including food packaging adhesives), and in metal degreasing, pesticides, textile processing, aerosols, lubricants, drain cleaners, shoe polishes, spot cleaners, printing inks, and stain repellents. TCA is emitted during use of items prevalent in the average home, such as liquid detergent, wallpaper glue, carpets, spray and solid insecticides, carpet glue, and chlorine bleach scouring powder.

TCA-contaminated groundwater was found at 27% (380) of the 1,416 current and former NPL sites. Of these sites, 42% (161) had private well systems, 19% (72) had municipal systems, and 39% (147) used both private and municipal systems to provide residents with drinking water .

The TCA Subregistry baseline interview gathered information on 3,665 persons (3,204 living and 461 deceased) who had documented exposure in their drinking water and were exposed for at least 30 days. The first follow-up interview gathered information on 3,473 persons (2,963 living, 510 deceased). In 1995, statistical analysis of the baseline and first follow-up data of the 3,665 TCA Subregistry registrants from one site in New York (Vestal Water Supply Well #1, New York) was completed.

TCA Baseline and Followup 1 Technical Report

In 1995, the *National Exposure Registry TCA Subregistry Baseline and Followup 1 Technical Report* was published. Comparisons of the registrants' reporting rates (baseline and followup 1) to national norms show statistically significant increases ($p \leq 0.01$ significance level) at baseline for anemia and other blood disorders in females 25 through 34 years and 65 years of age and older; for arthritis in males 10 through 17 years of age; and for urinary tract disorders in females 10 through 17 years, 25 through 34 years, and 65 years of age and older and in males 35 through 44 years of age. At followup, statistically significant increases were seen for anemia in females 26 through 35 years of age and for urinary tract disorders in females 19 years of age and older and in males 26 through 25 years and 66 years of age and older. Statistically significant deficits were reported for the TCA Subregistry population (for specific age and sex groups) at either baseline or followup or both for the following health conditions: arthritis, asthma and emphysema, diabetes, hearing impairments, hypertension, kidney disease, respiratory allergies, speech impairments, ulcers or other stomach problems, and mental retardation. Although statistically significant differences were identified for some age groups at baseline and first followup, the results suggest no overall excess reporting of a specific health outcome by registrants compared with national norms.

Benzene Subregistry

Benzene found in the air, groundwater, and soil is from natural processes and human activities. Natural sources, including volcanoes and forest fires, account for a small amount. Benzene is also a natural part of crude oil. Because of its wide use, benzene ranks in the top 20 in production volume of chemicals produced in the United States.

In FY 1994, statistical analysis of the baseline data of the 1,143 Benzene Subregistry registrants from one site in Texas (Three Lakes Municipal Utilities District, TX) was completed. The *National Exposure Registry Benzene Subregistry Baseline Technical Report* was published.

Benzene Baseline Technical Report

In June 1995, the *National Exposure Registry Benzene Subregistry Baseline Technical Report*—summarizing the activities and results of statistical analyses of the Benzene Subregistry—was released. At that time, the Benzene Subregistry contained information on 1,143 persons (1,127 living and 16 deceased at the time of baseline data collection) who had documented exposure to benzene in the drinking water from the Three Lakes Municipal Utilities District in Texas. The morbidity data analyses indicated an increased reporting of several health outcomes by Benzene Subregistry registrants. Statistically significant increases ($p \leq 0.01$ significance level) of diabetes were reported for males 10 through 17 years. Urinary tract disorders were reported in excess for females of all ages. Skin rashes were found in excess in males and females 0 through 9 years and 65 years and older. Kidney disease was reported in excess for males and females 55 through 64 years. Respiratory allergies were reported in excess for males and females 0 through 9 years. Statistically significant deficits were reported for the Benzene Subregistry population (for specific age and sex groups) for hearing impairments, asthma and emphysema, and arthritis.

Dioxin Subregistry

Dioxin, the contaminant selected for the second ATSDR subregistry, does not occur naturally nor is it intentionally manufactured by any industry. It can be inadvertently produced in very small amounts as an impurity during manufacture of certain herbicides and germicides and has been detected in products of incineration of municipal wastes.

To create the Dioxin Subregistry, ATSDR contacted a subset of the 2,887 persons on the Missouri Dioxin Listing (250 persons in Missouri who had previously participated in health studies conducted at dioxin sites). Baseline interviews were conducted with those registrants at four NPL sites in Missouri (Minker/Stout/Romaine Creek site, Quail Run Mobile Home Park, Shenandoah Stables, and Times Beach) in the fall of 1989; follow-up interviews took place in 1990, 1991, and 1993. An analysis of the baseline data was completed in FY 1994; a report of the analysis was completed in FY 1995 and is currently under review.

National Exposure Registry Validation and Assessment Studies

In FY 1995, ATSDR continued its evaluation of the National Exposure Registry database. During the past several years, ATSDR has submitted the National Exposure Registry procedures and findings to a number of technical reviews to identify issues and problems that require evaluation, to validate program direction, and to ensure high quality. From these reviews, five program issues have been identified that merited further investigation: 1) validation of exposure information; 2) evaluation of National Exposure Registry and National Health Interview Survey question-

naire differences; 3) development of the numerator and denominator for mortality rates, calculation of these values for the TCE Subregistry baseline population, and comparison of the values to national rates; 4) validation of self-reported illnesses; and 5) review of the National Exposure Registry questionnaire.

During FY 1995, several such program issues were evaluated. These evaluations have been important in validating the quality of the findings and the direction of the program. The studies addressed the validity of self-reported data and whether several sociological factors—knowledge of exposures, medical care-seeking behaviors, and the presence of litigation within the community where the site is located— influence the rates of self-reporting symptoms and illnesses.

Surveillance

Epidemiologic surveillance has been defined by the Centers for Disease Control and Prevention as the “ongoing systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know.” ATSDR has initiated epidemiologic surveillance programs because they are an important tool for evaluating adverse health effects that may occur at low rates over a period of time. ATSDR uses surveillance methods to evaluate communities and hazardous waste workers for trends in illnesses that require further evaluation.

Hazardous Substances Emergency Events Surveillance System

1995 Summary Report (1994 Data)

In 1990, ATSDR implemented an active, state-based hazardous substances emergency events surveillance system to describe the public health consequences associated with the release of hazardous substances. Five state health departments participated in the pilot phase of the surveillance system and began data collection on January 1, 1990. By 1994, the number of participating state health departments had increased to 12. During FY 1995, ATSDR released a report summarizing the characteristics of events reported to the surveillance system from January 1, 1994, through December 31, 1994.

Information on acute hazardous substances emergency events was collected on data collection forms designed by ATSDR. The types of items collected included general information on the event, substance(s) released, victims, injuries, and evacuations. The number of people at risk of exposure to a particular event was estimated. Several data sources were used to obtain the maximum amount of information about these events: records or oral reports of state environmental protection agencies, police or fire departments, and hospitals. The data obtained were maintained online using an ATSDR-provided data entry system; quarterly results were sent to ATSDR.

The 12 states reported 4,244 events for 1994; 70% occurred at fixed facilities and 21% were transportation related. In 90% of the events, only a single substance was released. The most commonly reported substances were “volatile organic com-

pounds (VOCs)," "acids," "other inorganic substances," and the category designated "other," which included mixtures of substances and substances released so infrequently that they did not merit a separate category. During this reporting period, 415 events (10% of all events) resulted in 2,178 victims. The most frequently reported injuries sustained by victims were respiratory irritation, eye irritation, nausea, and headache. There were 20 deaths; 574 events required evacuations.

Only 12 states collected data; therefore, the data might not be representative of events in the entire country. However, the findings regarding the distribution of the types of events, the number of events with victims and evacuations, and the injuries reported have been consistent over time.

Hazardous Waste Workers Surveillance

ATSDR developed a protocol for conducting surveillance of hazardous waste workers and awarded a contract for conducting this surveillance to the Laborers' Health and Safety Fund of North America (LHSFNA) of the Laborers' International Union of North America (LIUNA) in September 1990. LIUNA represents approximately 10,000 hazardous waste workers. Approximately one-third of LIUNA members are employed annually in the field of hazardous waste remediation. Data from the annual administration of a questionnaire to hazardous waste workers who are members of LIUNA will be evaluated to determine the chronic morbidity and mortality rates of these workers. Because hazardous waste workers are potentially exposed to higher concentrations of contaminants, researchers can use information gathered from this population to evaluate a range of exposures.

Additional baseline questionnaire interviews were conducted in FY 1995, bringing the total number of LIUNA-related workers interviewed to 4,576. Also in FY 1995, follow-up interviews were emphasized; 2,192 workers were re-interviewed.

During the past fiscal year, 396 workers with potential radiation exposure from DOE sites were in the ATSDR surveillance system. This subgroup receives the same baseline questionnaire and follow-up questionnaire; radiation measurements from the workers' personal monitoring badges are also obtained.

Medical Monitoring

In July 1995, ATSDR initiated a program of medical surveillance by publishing in the *Federal Register* (60 FR 38840) ATSDR's Final Criteria for Determining the Appropriateness of a Medical Monitoring Program under CERCLA. ATSDR refers to programs included under health surveillance as "medical monitoring or screening"; it is defined in the legislation as "the periodic medical testing to screen people at significant increased risk for disease." The legislation states that a mechanism to refer people for treatment should be included in the program.

The criteria outlined in the *Federal Register* will be used to determine the appropriateness of conducting medical monitoring in a community and will be applied in a phased approach. Phase I, conducted by ATSDR, consists of an evaluation of exposure (level of environmental contamination and identification of the exposed population) and outcome (degree of association with exposure and ability to inter-

vene if identified) criteria. Phase II consists of an evaluation of the system criteria (ability to conduct screening with a good test, and the development of a referral system). Phase II will be conducted by a panel of community, state, and local health officials and ATSDR. At the end of Phase II, a detailed medical monitoring plan will be written at sites where a monitoring program is established. All of the criteria must be met for a medical monitoring program to be established at the site.

Medical monitoring is considered one of several follow-up health activity options under the site-specific work conducted by ATSDR. A medical monitoring program for the community around a site will be considered when information from ATSDR's initial response at the site is reviewed. In cases in which there is no known association between the exposure and specific adverse health effects (which could include health outcomes, illnesses, or markers of effect), medical monitoring is not appropriate. In cases in which there is limited information on a specific health effect's relationship to exposure, more appropriate options include epidemiologic surveillance, a disease- and symptom-prevalence study, or an epidemiologic study. When adequate information exists linking exposure to a substance with a specific adverse health effect, further consideration will be given to the appropriateness of medical monitoring in that population.

Biomarker Workshops

ATSDR currently has identified or developed batteries of tests to determine the extent of health effects in persons exposed to hazardous waste from Superfund sites. Test batteries are currently being used to identify the following priority health conditions: kidney and liver disorders; neurobehavioral effects (adults), and lung and respiratory diseases. Work continues on development of test batteries for immune function disorders, cancer, and reproductive and birth defects.

Immune Function Disorders

The Immune Function Disorders Expert Workshop, held in June 1995, provided 4 recommendations: 1) conduct monoclonality testing of the participants with increased B-lymphocyte counts to confirm the finding, 2) evaluate other populations or databases to see if chronic lymphocytic leukemia (CLL) may cluster around hazardous wastes sites, 3) more accurately determine the background prevalence of B-lymphocytosis, 4) consider conducting a longitudinal evaluation of persons with elevated B-lymphocyte counts to determine the risk of progression to pathologic lymphoproliferative disorders. ATSDR has initiated the testing plan to confirm monoclonality among the participants; tests will be conducted in FY 1996. ATSDR researchers also have identified for evaluation a dataset from a study of farming areas in Nebraska, Kansas, Iowa, and Minnesota. The dataset identifies cases of CLL; ATSDR will evaluate the information to determine if the cases cluster around sources of hazardous substances.

Kidney Disorders

In September 1995, ATSDR supported a workshop conducted jointly by the CDC and the European Union (EU) to evaluate biomarkers for nephrotoxicity. With the

assistance of CDC and EU, ATSDR will abstract the discussions of this workshop and prepare an assessment of tests for kidney disorders for use in environmental health field studies.

Neurotoxic Disorders

Neurotoxic substances are extremely prevalent at hazardous waste sites, and children are especially susceptible to exposures to many of these substances and their toxic effects. In September 1995, ATSDR released a comprehensive manual on neurobehavioral testing entitled *Adult Environmental Neurobehavioral Test Battery*. This report, because of available tests and experiences, focused on adults, but also reviewed elements of a screening battery of neurobehavioral tests that could be used for children. Functional domains and age considerations were featured in that report.

In FY 1995, ATSDR completed a project to develop a battery of screening tests that could be used on children. The pediatric environmental neurobehavioral test battery (PENTB) was designed for children from 1 through 16 years of age and emphasizes tests appropriate to stages in a child's development. The assessment of children younger than 4 years is restricted to four informant-based instruments. The assessment of children 4 through 16 years includes 10 performance-based tests to evaluate cognitive, motor, and sensory domains. The final report, a comprehensive manual on pediatric neurobehavioral testing, will be released in FY 1996.

Cancer of Selected Anatomic Sites

In FY 1995, ATSDR continued to work with participants of the FY 1994 cancer biomarkers workshop to assess cancer test batteries for use in environmental health field studies. A report is expected to be completed in FY 1996.

4

Division of Health Education

Summary of Site-Specific Activities

In the past, ATSDR targeted its health education program to health professionals. While continuing this effort, the agency began to refocus this program toward community health education in FY 1994. In FY 1995, ATSDR integrated the two focuses—health professionals education and community health education—and made this new approach a standard practice when developing site-specific health education programs. To facilitate this transition, relationships with traditional partners—state and local health departments, tribes, and health professional organizations—were maintained, but refocused to include community health education.

Historically, community health education needs have been considered late in the public health assessment process. Recognizing that information needs are frequently paramount to a community, ATSDR has modified its approach to sites to become involved earlier in the process. To plan more effective health education efforts, the agency now attempts to identify the community structure, health infrastructure, stakeholders affected by the site's health issues, and the concerns expressed or implied by various community members. With input from and concurrence of the community, agency staff members develop a site-specific health education plan. The purpose of the health education plan is to address the community's health concerns and provide local health care professionals and community members with appropriate health information.

Environmental health education provides community members that may be affected by a hazardous waste site and local health professionals with the information they need to make important choices that can protect human health. ATSDR's new program of site-specific preventive health education (SSPHE) focuses the agency's limited resources where they are most needed: communities near hazardous waste sites covered by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). Developed through a dialogue between ATSDR health education personnel and the community's members and organizations, each community's program is a customized approach making use of existing local resources and building local capacity to develop and sustain new resources.

During FY 1995, the second year of the site-specific program, ATSDR, in cooperation with its partners, implemented health education activities at 158 hazardous waste sites. Staff members focused on working with local community members and local health agencies to determine educational needs, develop and deliver programs, and ensure that health education programs met the needs of the community. Activities were expanded to include educational outreach to schools, public safety personnel, local community groups, and libraries. Many programs were based on existing materials, such as the *Case Studies in Environmental Medicine* series. New educational materials were developed to meet the specific needs of affected communities.

In FY 1995, ATSDR provided funding and technical assistance to the following states and tribal governments through cooperative agreements: Arizona, Arkansas, California, Colorado, Connecticut, Florida, Idaho, Illinois, Iowa, Louisiana, Massachusetts, Michigan, New Jersey, Oklahoma, Oregon, South Carolina, Texas, Washington, Wisconsin, and the Prairie Island Indian Community. Through these cooperative agreements, the states reached more than 3,000 people, including health professionals and other community members, through educational activities such as seminars, grand rounds, conferences, exhibits, public meetings, and school presentations. In addition, states developed and distributed numerous site-specific and other materials to educate and inform the public—including health professionals—about relevant environmental health and site-specific issues. These materials included resource directories, site- and chemical-specific fact sheets and pamphlets, and materials instructing health professionals in how to take exposure histories. The following summaries are representative of site-specific health education activities in FY 1995. (See Appendix I for a complete list of sites receiving community health education in FY 1995.)

U.S. Department of Agriculture CCC Grain Bin Sites, Kansas, Nebraska, and Iowa

In Kansas, Nebraska, and Iowa, more than 60 former U.S. Department of Agriculture Commodity Credit Corporation (CCC) grain storage sites have contaminated the groundwater with carbon tetrachloride. Until 1986, carbon tetrachloride, which the U.S. Department of Health and Human Services has determined may be a carcinogen, was used to fumigate grain.

The state of Kansas was chosen to implement a pilot educational effort to reach physicians providing care for the residents affected by these widely dispersed sites and provide them with strategies to reduce their patients' exposure to carbon tetrachloride. The Department of Family and Community Medicine at the University of Kansas School of Medicine-Wichita and the Kansas Academy of Family Practice worked in partnership with ATSDR and the Oak Ridge Institute for Science and Education to plan and implement this project.

The partners used stand-alone environmental physician education materials, selected presentations, and peer motivation strategies to encourage rural physicians to learn about carbon tetrachloride exposure and its potential health effects and patient counseling strategies.

The program's evaluation showed that the physicians in the targeted areas became aware of the contamination and questioned their patients about potential exposure. A significant percentage indicated that they would counsel their patients about the potential health risks associated with carbon tetrachloride exposure.

Tri-State Mining District Site, Missouri

Located partly in southwest Missouri, the Tri-State Mining District has been one of the largest lead-zinc mining areas in the world since the mid-1800s. The Jasper County Superfund site currently comprises approximately 240 square miles of the

district. The site is characterized by multiple waste piles and contaminated soils that resulted from mining, milling, and smelting of ore. Joplin is the region's major population center.

In Joplin, ATSDR staff members involved community groups in planning and implementing health education programs. To date, the Joplin school district has taken on health education concerning the site as a community project. Participants are developing a site-specific curriculum for teaching students about community lead issues. ATSDR staff members also will train Girl Scouts in the Ozark Region as community educators.

Two results are expected from this project: (1) dissemination of information to the community will be improved through use of several communication methods, and (2) ATSDR's efficiency and effectiveness at sites will be increased by working in close partnership with community organizations.

ALCOA/Lavaca Bay, Point Comfort, Texas

ATSDR awarded a new cooperative agreement to the Texas Department of Health (TDH) for health education activities in FY 1995. The state had already been involved in conducting a public health assessment for the ALCOA/Lavaca Bay site. During FY 1995, state staff members developed a series of educational activities targeted at health professionals and other community members in the area.

The ALCOA/Lavaca Bay National Priorities List (NPL) site is located in Calhoun County, Texas, near Point Comfort and Port Lavaca. The site includes areas associated with current and former operations of the Aluminum Company of America (ALCOA) Point Comfort plant and a section of Lavaca Bay adjacent to ALCOA that has been contaminated with mercury.

Mercury has been detected throughout the site in surface soil, shallow groundwater, air, bay sediment, fish, and crabs. In April 1988, TDH banned taking of finfish and crabs from a portion of Lavaca Bay because dangerous levels of mercury were found in fish sampled near the ALCOA Point Comfort operations. Consumption of contaminated fish, crabs, or oysters from the closure area could cause exposure to excessive amounts of mercury. Because eating fish contaminated with mercury at the concentrations observed at this site could affect a developing fetus and because the potentially exposed population includes women of childbearing age, the site has been classified as an urgent public health hazard.

During FY 1995, TDH conducted a variety of educational activities related to this site:

- TDH presented "Assessing Environmental Exposures in Texas: Roles of the Texas Department of Health and Public Health Nurses," in October 1994 at the University of Texas School of Nursing in Austin. Sixty-seven nursing students and two community health nursing faculty attended. Attendees learned about pathways of exposure to environmental toxins, including ingestion of mercury through eating contaminated fish.

- TDH also discussed Lavaca Bay during its presentation "Dumps and Spills: Addressing Public Health Impact and Community Concerns," in December 1994 at the Texas Department of Health Quarterly Continuing Medical Education Program. Thirty-seven health professionals—primarily physicians—attended.
- TDH held the presentation "Addressing Hazardous Substance Exposures: Tools and Resources for Community Health Nurses" in February 1995. Ninety-nine health professionals, mostly nurses, attended. Attendees learned how to take an exposure history and were provided sources of information and consultation in dealing with environmental exposures. Mercury exposures were discussed in detail, using the Lavaca Bay site as an example.
- TDH developed a pamphlet to educate community members about the Lavaca Bay closure area. During the health assessment process, concerns were raised about the inadequacy of signs marking the closure area. Because no maps of the closure area were available to area residents, a pamphlet showing the closure area was considered an urgent public health need by the health department, citizen advisory panel members, and area residents. The state developed a pamphlet in English and Spanish titled *Fishing or Crabbing at Lavaca Bay? What You Should Know About Mercury Contamination and the Closure Area*. The pamphlet includes a map of the closure area and provides basic information about the health effects of mercury. The pamphlet was distributed at a public meeting in April and through area clinics, businesses, and local government offices. As of August 1995, approximately 3,000 copies in English and Spanish had been distributed.
- In April 1995 during a public meeting, TDH held a presentation on potential adverse health effects of eating fish or crabs from the closure area of Lavaca Bay. Twenty community members attended.
- TDH staff members attended a Port Lavaca Chamber of Commerce Commercial and Industrial Trade Show and displayed a map of the closure area; they also participated in a series of panels that provided questions and answers from the community health concerns section of the public health assessment. They distributed copies of the closure area pamphlet.
- Because mercury can be especially harmful to children and fetuses, TDH is preparing a version of the closure area pamphlet for use in the state's Women, Infants, and Children (WIC) program clinics. A Spanish translation will also be prepared.

Building Partnerships and Capacity To Communicate Environmental Health Messages

Members of communities located near hazardous waste sites are often very concerned about their potential exposures to hazardous substances. That concern can make effective communication difficult; however, effective communication is a cornerstone of education. ATSDR has worked with its partners to enhance the ability

of health care professionals to communicate effectively with the public. For example, the agency supports the efforts of NACCHO, the Association of State and Territorial Health Officials, and the National Environmental Health Association to provide risk communication training, and supports the efforts of tribes to educate tribal health care providers and tribal members about environmental health issues. ATSDR also funds conferences and similar meetings that permit individuals engaged in health research, education, and application to communicate information critical for developing and implementing effective programs to prevent adverse health effects from hazardous substances.

Association of State and Territorial Health Officials

The Association of State and Territorial Health Officials (ASTHO) consists of public health directors in each of the 50 states, the District of Columbia, and the U.S. territories. The purpose of the association is to formulate and influence the establishment of sound national public health policy and to assist and serve state health departments in the development and implementation of state programs and policies for the public's health and prevention of diseases. ATSDR's cooperative agreement with ASTHO is intended to address the need to improve exchange of information between states and federal agencies, and between state agencies, and to increase training opportunities to help states improve communication of risk information to the public.

In FY 1995, ASTHO conducted risk communication workshops for 142 state-level environmental health specialists from Alabama, Connecticut, Georgia, and Pennsylvania. ASTHO also provided electronic seminars on a variety of health and environment topics for 1,210 health professionals.

National Association of County and City Health Officials

The National Association of County and City Health Officials (NACCHO) is a non-profit organization serving all 3,000 local health departments nationwide—in cities, counties, and districts. NACCHO provides education, information, research, and technical assistance to local health departments, and facilitates partnerships among local, state, and federal agencies to promote and strengthen public health. ATSDR's cooperative agreement with NACCHO is intended to help educate local health departments about environmental health issues and risk communication.

In FY 1995, NACCHO completed its 3-year cooperative project with ATSDR to conduct environmental health training courses and build environmental health capacity in local health departments. The final products of this cooperative agreement were the documents *Don't Hazard a Guess: Addressing Community Health Concerns at Hazardous Waste Sites* and *Risk Communication Training Made Easy: A Guide for Local Health Officials*.

More than 1,000 copies of *Don't Hazard a Guess* were distributed to local, state, and federal health and environmental officials, and to interested members of academia, the medical profession, and the public. The handbook's purpose is to help local health officials and others respond to community health concerns and ques-

tions related to hazardous waste sites and the chemicals found at those sites. The following topics are included:

- the Superfund process, the roles of the various agencies involved, and the sequence of events;
- roles for local health officials and options for local health department involvement; and
- strategies to address community concerns and maximize community involvement.

Risk Communication Training Made Easy was developed to assist individuals and organizations in conducting a risk communication training course. The materials in the guidebook include the following:

- a synopsis of the NACCHO risk communication course, including goals and objectives of the course and descriptions of each portion of the agenda;
- practical suggestions on planning and promoting a risk communication training course, drawn from NACCHO's experience of conducting courses for more than 800 state and local health officials nationwide;
- a list of resources on risk communication issues and training; and
- sample handouts and evaluation forms.

NACCHO also started work on a new ATSDR cooperative agreement project concerning community health education and community involvement. NACCHO developed a needs assessment tool for local health department use and, in June 1995, a panel of ATSDR staff and NACCHO members selected eight local health department applicants to serve as pilot sites for conducting community health education and community involvement needs assessments: Mobile County Health Department (AL), Farmington Valley Health District (CT), Fulton County Health Department (GA), Glynn County Health Department (GA), LaPorte County Health Department (IN), Cecil County Health Department (MD), Niagara County Health Department (NY), and New York City Health Department (NY). In July 1995, staff members from these health departments received training in risk communication techniques, the basics of toxicology and epidemiology, information resources, and community involvement strategies. The local health department participants were paired with peer advisors who had successfully dealt with the Superfund process in their communities and will offer the project participants their experience and suggestions as the projects progress. Project participants spent the remainder of FY 1995 developing community profiles, conducting needs assessments, and developing plans for implementing education and involvement activities in FY 1996.

National Environmental Health Association

The National Environmental Health Association (NEHA) is a professional society of approximately 5,700 people engaged in environmental health and protection for government agencies, public health and environmental agencies, industry, colleges,

and universities. They conduct a national professional registration program and offer continuing education programs.

In pilot year FY 1995, NEHA presented three risk communication workshops in Colorado, Michigan, and New Mexico to 126 health professionals (7 private industry, 1 academic, 4 federal contractors, 35 state, 79 local). The course is based on the model developed by NACCHO. The format developed uses a case study of an actual site. The course provides professionals with practical tools and an understanding of how to use them in effectively communicating risk to the public. As a result of the course, participants should understand the assumptions used in calculating risk, learn the principles of good risk communication, and demonstrate application of those principles through discussion of a relevant case study. Participants also share their experiences and concerns to ensure the course addresses areas in which they feel the need for more training.

Tribal Partners

In FY 1995, ATSDR supported health education cooperative agreements with the following tribal governments or consortia: Eight Northern Indian Pueblos Council (ENIPC), Ely Shoshone Tribe, National Tribal Environmental Council, Nez Perce Tribe, Prairie Island Indian Community, Seneca Nation of Indians, and St. Regis Mohawk Tribe.

FY 1995 accomplishments include the following:

- The Prairie Island Indian Community shared its newsletter and ATSDR health education materials, including the *Case Studies in Environmental Medicine*, with local clinic staff. Clinic physicians will start taking exposure histories of tribal members. The Prairie Island Community also distributed fact sheets and pamphlets on environmental health issues at the clinic and through Indian Health Service community health representatives.
- The St. Regis Mohawk Tribe completed its primary caregivers education needs assessment survey. Cornell University will conduct the statistical analysis of the data.
- ENIPC developed a needs assessment survey and used it to collect environmental and health information at most of the eight northern pueblos.

Public Health Conference Support Grant Program

Through this program, ATSDR supports state, local, academic, national, and international health efforts to prevent or reduce illness, disability, and premature death from exposure to toxic substances. Systematic approaches are needed for linking applicable resources in public health with individuals and organizations involved in public health practice. Mechanisms are also needed to shorten the time frame between the development of disease prevention and health promotion techniques and their practical application. Conferences and similar meetings that permit people engaged in health research, education, and application to interact are critical for the development and implementation of effective prevention programs.

The following public health conference support grants were awarded in FY 1995:

- Massachusetts Department of Public Health (Massachusetts Health Research Institute): "Improving Risk Communication Through Community Development"
- University of Arkansas for Medical Sciences, Arkansas Children's Hospital Research Institute, Department of Pediatrics: "Neurotoxicity of Mercury Indicators and Effects of Low-Level Exposure"
- Minnesota Department of Health: "Assessing Environmental Exposure: The Role of the Public Health Nurse"
- Research Foundation, State University of New York: "Workshop of Human Health Indicators in Areas of Concern in the Great Lakes Basin"
- University of Texas Medical Center: "Second International Conference on Environmental Mutagens in Human Populations"
- South Carolina Department of Health and Environmental Control: "Future Search Conference on Environmental Justice"

Association of Occupational and Environmental Clinics

The Association of Occupational and Environmental Clinics (AOEC) is a network of 53 clinics and 300 individual members in the United States and Canada. Through a cooperative agreement with ATSDR, AOEC works to enhance the education and practice of health care providers and medical, nursing, and public health students in surveillance, diagnosis, treatment, and prevention of injury or illness associated with exposure to hazardous substances. During this reporting period, AOEC focused on collaborating with ATSDR to provide health professional education training related to NPL sites and capacity building.

In FY 1995, AOEC conducted the following activities:

- trained 649 health professionals on topics such as arsenic exposure, trichloroethylene contamination of groundwater, how to take an environmental history, lead and heavy metal poisoning, air pollution, and site-specific toxicology related to explosives, beryllium and pesticide exposure, and reproductive health.
- continued to provide technical assistance to health care providers through the AOEC Lending Library and support of electronic information resources. AOEC and Duke University established a World Wide Web page (<http://152.3.65.120/oem/>) that contains a directory of AOEC clinics and clinic criteria and current AOEC newsletters. AOEC also distributes the latest in occupational and environmental health information through its occupational and environmental medicine e-mail list, "OEM-List," which currently has more than 1,100 subscribers. AOEC used this e-mail network and AOEC members list to distribute more than 400 copies of ATSDR's proceedings of the 1993 International Congress on Hazardous Waste and the U.S. Environmental

Protection Agency's (EPA) *Managing Pesticide Exposures*. An OEM-List message archive is also available through the Duke University/AOEC home page.

- in commitment to international cooperation, a physician from the Mt. Sinai AOEC clinic in New York used AOEC materials in a program leading to a certificate in public health for candidates in Armenia. Environmental health videos and a toxicology computer program were provided to the host institution in Armenia.
- responded to 201 occupational or environmental health inquiries referred by ATSDR, the National Institute for Occupational Safety and Health (NIOSH), and other sources. All inquiries were referred to the AOEC clinic closest to the caller or to a clinic member with expertise related to the caller's health concern.
- completed two curriculum modules (*Environmental Dermatology* and *Household Hazards*) that are part of a series of environmental health curriculum modules that will be developed based on AOEC membership needs and ATSDR-identified priority health conditions.
- supported the first year of the American Medical Student Association's medical student summer field placement program. The students worked on a variety of educational materials, including information on primary lead protection for workers and their families.
- completed a new directory of residency programs in cooperation with the American College of Occupational and Environmental Medicine and the Association of Teachers of Preventive Medicine.
- completed a draft needs assessment to help determine the environmental health education needs of health care providers serving communities affected by hazardous waste sites.
- provided speakers, partial funding for resource materials, and evaluation expertise for the collaborative training program, "Environmental Health Education for Health Care Professionals Train-the-Trainer Workshop" in Boise, Idaho, in August 1995. Thirty-four health care professionals attended.

Case Studies in Environmental Medicine

In 1990, ATSDR began developing a series of monographs, *Case Studies in Environmental Medicine*, to educate health professionals about the health effects caused by hazardous substances in the environment. These self-instructional exercises in environmental medicine are designed to guide primary care practitioners through the diagnosis and treatment of illness in persons exposed to hazardous substances in the environment.

The *Case Studies* are used for training health care professionals who practice near communities affected by a hazardous waste site or sites, at undergraduate medical schools and residency programs, and in environmental courses at schools of public

health to educate health care professionals about how to identify, treat, and prevent human exposure to hazardous substances. The *Case Studies in Environmental Medicine* have been approved for continuing medical education credit for physicians and continuing education units for other health professionals. In addition, the *Case Studies* are acceptable for credit by professional organizations, including the American Academy of Family Physicians, the American College of Emergency Physicians, the American Osteopathic Association, the American Association of Occupational Health Nurses, and the American Board of Industrial Hygiene.

Following are FY 1995 accomplishments related to the *Case Studies* series:

- 107,989 *Case Studies in Environmental Medicine* were distributed.
- Through a cooperative agreement with the Michigan State Health Department, the monograph *Case Studies in Environmental Medicine: Taking an Exposure History* was sent to more than 4,000 physicians practicing in counties with NPL sites. The recipient physicians' specialties included allergy, dermatology, emergency medicine, general practice, general preventive medicine, neurology, obstetrics/gynecology, occupational medicine, pediatrics, public health, pulmonary medicine, geriatrics, internal medicine, and critical care medicine. A cover letter informed recipients that they practice in a county having specific hazardous waste sites and that they may receive questions about the site from patients. The letter identified and described the sites of concern and listed the contaminants of concern and the primary routes of exposure. The state also included toxic substances fact sheets in the mailing. During this reporting period, approximately 25% of physician recipients returned evaluation cards.

Continuing Medical Education

ATSDR annually provides continuing education credit to health providers who participate in the agency's continuing education offerings. ATSDR processes all requests for clearance to award continuing medical education (CME) credits and continuing education units (CEUs) before submitting the requests to the Centers for Disease Control and Prevention (CDC). CME credits and CEUs are awarded to physicians and other health professionals internally and externally to assist them in obtaining continuing education needed to maintain professional certification or licensure. In FY 1995, ATSDR, in cooperation with CDC, awarded CME credits or CEUs to 600 participants for completion of 1,500 *Case Studies in Environmental Medicine*.

Medical Management Guidelines for Acute Chemical Exposure

To help emergency planners, first responders, and hospital personnel prepare for and respond to emergency incidents, ATSDR has developed *Medical Management Guidelines for Acute Chemical Exposure*, a manual that provides information on managing acute exposures resulting from chemical incidents. Intended to supplement the education and training of emergency medical technicians and others who respond to chemical emergency incidents, the *Medical Management Guidelines (MMGs)*

are a resource for information about the toxicity and health effects of hazardous exposures and information about personal protection and decontamination.

The *MMGs* focus on 27 chemicals that are found at hazardous waste sites or that commonly cause death or injury when people are exposed during emergencies. Topics discussed include clinical symptoms; pre-hospital care (decontamination, triage, and transportation); hospital care (including specific procedures to manage treatment of the patient); chronic exposure information; patient information; and follow-up instructions. The *MMGs* are the third volume of a three-volume set entitled *Managing Hazardous Materials Incidents*.

In FY 1995, ATSDR provided *MMGs* to 800 participants of the 6th Annual Hazardous Materials Emergency Response Workshop "The Continuing Challenge," held September 5-8 in Sacramento, California. Participants from hazardous materials teams from throughout the state of California attended.

Increasing Access to Information

Many communities have no access to information about hazardous substances; however, most have identified information sources, such as libraries and schools, that could access and provide this information if given the necessary tools. In keeping with ATSDR's mission, the agency focuses on ways of providing both health care providers and the public with access to information through existing information sources. Rather than trying to provide information solely to individuals, the agency has determined that providing information to existing information sources, both old and new, multiplies its effectiveness.

The agency produces materials in a variety of formats and media and disseminates information in many ways. Following are representative examples.

National Library of Medicine

ATSDR is mandated by Congress in CERCLA and the Superfund Amendments and Reauthorization Act to establish and maintain a comprehensive and publicly available inventory of literature, research, and studies on the health effects of toxic substances. ATSDR has met this congressional mandate by establishing and maintaining the Hazardous Substances Data Bank (HSDB), the premier factual toxicologic database at the National Library of Medicine (NLM). TOXNET, the primary network developed by NLM's Toxicology Information Program, includes the HSDB, the EPA Toxic Release Inventory (TRI) file, the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS), and 10 other files related to hazardous substances.

The FY 1995 interagency agreement with NLM concentrated on (1) support for the continued development and improvement of the HSDB and (2) environmental information outreach training in accessing medical, occupational, and toxicological information for members of the Historically Black Colleges and Universities (HBCU) system. The environmental information outreach training was incorporated into the agency's Minority Health Program and focused in FY 1995 on training health professionals and educators in the Mississippi Delta region. EPA's Office of Environmental

Justice was a co-sponsor of the training provided to Mississippi Delta professionals. Nineteen people were trained at Howard University in May 1995. For the first time, participants received instruction in use of the agency's HazDat database, which contains data on hazardous substances at NPL sites and the actual or potential exposure at the sites.

Library Resource Support

ATSDR provides permanent, local sources of information about hazardous substances to communities by distributing its publications to libraries.

In FY 1995, approximately 4,000 public health statement notebooks were distributed to libraries across the country, including those serving as repositories of Superfund site information. The public health statements, derived from ATSDR toxicological profiles, are brief summaries of information on specific toxic substances. Each summary focuses on the human health effects from exposure to each of the substances.

Hazardous Substances and Public Health

The newsletter *Hazardous Substances and Public Health (HSPH)* was created in 1990 as a forum for public health professionals to examine the issue of and corrective measures for hazardous waste as it affects human health. The quarterly publication offers articles on federal, state, and tribal activities related to environmental health and updates on key meetings, publications, and training opportunities.

During FY 1995, *HSPH* featured articles that described how environmental carcinogens can mimic the effects of estrogens; the expanded role of nurse educators in environmental health education; how pets were linked to arsenic exposure at a hazardous waste site; and a ban on consumption of fish and shellfish in Brunswick, Georgia, where high levels of mercury, polychlorinated biphenyls, and lead have been found in soil and water.

In FY 1995, for the first time, readers were able to view *HSPH* on the Internet through ATSDR's home page on the World Wide Web (<http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html>). More than 3,000 readers gained access to *HSPH* on the Web.

A Primer on Health Risk Communication Principles and Practices

In FY 1995, the ATSDR-produced publication *A Primer on Health Risk Communication Principles and Practices* was developed to provide a framework of principles and approaches for the communication of health risk information to diverse audiences. It was published for ATSDR staff, health care professionals practicing near hazardous waste sites, and personnel from other government agencies and private organizations who must respond to public concerns about exposure to hazardous substances in the environment. The primer is available on the Internet through ATSDR's home page (see address in preceding paragraph). In August and September 1995, 460 readers accessed the information.

Special Initiatives

Multiple Chemical Sensitivity Initiative

Multiple chemical sensitivity (MCS) is a poorly defined syndrome that may be caused by exposure to very low levels of chemicals. Public concern about MCS prompted Congress to request that ATSDR fund workshops on chemical sensitivity and low-level chemical and environmental exposure. ATSDR's first action to address the mandate was to convene in April 1993 a panel of experts who advised the agency on activities that could be undertaken to produce scientifically valid information. After evaluation of that meeting, ATSDR developed four initiatives, three of which were coordinated by agency representatives. These three ATSDR-coordinated initiatives were (1) a workshop to consider neurologic research findings related to chemical exposures, (2) a federal interagency group to discuss and share ideas about MCS, and (3) MCS-related education.

In FY 1995, the following progress was made on these initiatives:

- **First initiative:** Release of the proceedings for the "Conference on Low-Level Exposure to Chemicals and Neurobiologic Sensitivity" held in April 1994 in Baltimore, Maryland. More than 30 speakers presented papers discussing the neurologic implications of low-level chemical exposure. The conference proceedings contain review papers on the neuropsychiatric aspects, history, and phenomenology of sensitivity to low-level chemicals; statements from chemical-sensitive people; panel and audience questions and responses; and 21 papers covering a wide range of neurobiologic issues related to this syndrome. Approximately 500 copies have been distributed.
- **Second initiative:** Representatives from ATSDR, CDC, the Department of Energy, NIOSH, EPA, the Department of Defense, the National Institute of Environmental Health Sciences, and the Department of Veterans Affairs began meeting as a workgroup to examine published reports, key findings and recommendations from previous expert panels, and other materials concerning MCS. The workgroup is evaluating the current scientific information and progress toward understanding the condition and will recommend areas for improved agency coordination and collaboration. These recommendations, as well as additional information on MCS, will form the basis for a policy paper.
- **Third initiative:** ATSDR staff members have continued serving as conduits of information about low-level chemical sensitivities. ATSDR representatives have given presentations on MCS before medical and public health groups, and the agency has provided printed information in response to public inquiries. In FY 1995, ATSDR released the publication *Multiple Chemical Sensitivity: A Scientific Overview*. This volume contains the proceedings from three national conferences on MCS. Approximately 400 copies were distributed.



Office of the Assistant Administrator

Public Health Practice Coordination Group

The Public Health Practice Coordination Group (PHPCG) is responsible for the 1) oversight and tracking of all public health actions conducted by the agency in communities living near hazardous waste sites; 2) management and coordination of the Health Activities Recommendation Panel; 3) coordination of the agency's Minority Health Program; 4) coordination of the agency's Community Involvement Program; 5) liaison with divisions and other offices within ATSDR and other federal, state, and local agencies and organizations to pursue public health and scientific matters related to the Comprehensive Environmental Response, Compensation, and Liability Act (also known as Superfund) and the Resource Conservation and Recovery Act, as amended, and the release of hazardous substances into the environment, and (6) oversight of agency special projects.

Health Activities Recommendation Panel

During FY 1995, the Health Activities Recommendation Panel (HARP), an agencywide, multidisciplinary panel, evaluated 79 sites to determine needed follow-up public health actions. The panel determined that follow-up health actions were indicated at 69 sites (87%). At those sites, 86 follow-up actions were indicated: 15 health studies (17% of follow-up actions) and 71 instances of site-specific health education (83%). Thirty-nine of these follow-up health actions were complete or ongoing.

Information on the HARP follow-up health determinations and public health action plans for each site has been maintained in a stand-alone database. During FY 1995, the information in the HARP database was transferred into the agency's hazardous substances release and health effects database, HazDat, and tested for use. By accessing the database, the public and other interested parties can obtain the status of follow-up health actions recommended by HARP or developed in the public health action plan for sites that HARP has evaluated.

Minority Health Program

Environmental Justice

Through Minority Health Program activities, the agency continued to address issues related to environmental justice. For example, staff members participated in the U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response Environmental Justice Taskforce. Environmental justice activities in FY 1995 included the Mississippi Delta Project: Health and Environment, minority health professions training, and site-specific actions. These activities are described in the following paragraphs and in chapters highlighting the accomplishments of each division.

Mississippi Delta Project: Health and Environment

A major component of the ATSDR Minority Health Program is the Mississippi Delta Project: Health and Environment. The project is an attempt by government, academia, private sector organizations, and community residents to implement, within a key geographic region, a program that demonstrates how partnerships can be formed to identify and reduce the impact of environmental hazards. The overall goal of the Delta Project is to demonstrate that partnerships between government, academia, private sector organizations, and community residents can identify key environmental hazards (and barriers to this identification), promote environmental quality, and reduce and, where possible, prevent these hazards from having an impact on health and the environment, with emphasis on persons in underserved communities. This goal is pursued jointly by federal agencies, state and local health departments, local community groups, and institutions of higher education, particularly those that serve large minority populations.

The Mississippi Delta Region consists of 219 counties along the Mississippi River. The region is populated by approximately 8.3 million people, including large numbers of persons with low income, African Americans, and growing numbers of other people of color.

During FY 1995, ATSDR staff members participated in Delta Project Steering Group meetings and meetings of the executive, assessment, membership, and structure workgroups to refine their charges and to discuss the status of the four profiles of the region's health and environmental status under development by Meharry Medical College.

Also in FY 1995, the Delta Project Steering Group endorsed the initiation of the Assessment Protocol for Excellence in Environmental Health (APEX-EH) pilot project, which is similar to the Assessment Protocol for Excellence in Public Health (APEX-PH). APEX-PH is a collaborative project between the Centers for Disease Control and Prevention (CDC), the National Association of County and City Health Officials (NACCHO), and other public health professional organizations at the national, state, and local levels aimed at enhancing the organizational capacity of local health departments and leadership in their communities. The APEX-PH community process strengthens the partnership between a local health department and its community to address health issues and, ultimately, to build a healthier community. The APEX-EH pilot project will be conducted in 22 counties in 3 Delta Region states—Arkansas, Mississippi, and Illinois.

During FY 1995, meetings have been held with ATSDR; CDC; representatives of the University of Arkansas-Pine Bluff, Mississippi Valley State University, and Southern Illinois University at Carbondale; and state and local health department representatives. States also began to collect health data for submission to the CDC Assessment Information Manager database. Environmental data will be collected and analyzed in early 1996; representatives from each state will meet in Atlanta with ATSDR and CDC staff members to review the data and ensure consistent reporting of like variables.

Minority Health Professions Foundation

The agency continued its support of activities funded in past years as part of a cooperative agreement with the Minority Health Professions Foundation: biomedical symposium, scientific lecture exchange, and environmental health education for physicians and pharmacists.

In FY 1995, the agency added two new activities to this agreement. Both are based at the newest member institution, Howard University. These activities, which began on October 1, 1994, are the Howard University Environmental Medicine Rotation and the Howard Nursing Project. The environmental medicine rotation assigns physicians in their third year of residency in emergency medicine to work with technical personnel from ATSDR's Division of Health Assessment and Consultation (DHAC) to examine the impact of the environment on the health of communities. The purposes of this program are to increase the medical expertise available to DHAC, and to introduce emergency medicine physicians to environmental public health. The purpose of the nursing project is to train nurses to recognize and care for persons exposed to environmental hazards. The nurses are also identifying materials and information that will be useful in curriculum development. The nurses at Howard are selecting communities in the Mississippi Delta Region as sites for nursing intervention models.

During FY 1995, ATSDR staff members participated in health professional training sessions for nurses, pharmacists, and physicians that were conducted with community representatives to discuss environmental justice issues and gather information about environmental health professional training. The meetings, which were sponsored by Howard University College of Nursing in conjunction with Southern University and Alcorn State University, were held in Baton Rouge, Louisiana, and Natchez, Mississippi.

Community Involvement Program

The PHPCG is responsible for the development of a coordinating strategy for the agency's Community Involvement Program. Community involvement is essential for early intervention and involving the community in decision making. Development of ATSDR community involvement strategy was initiated by ATSDR's community involvement staff members, community involvement representatives from the agency's partners in state health departments, and EPA headquarters and regional community relations personnel.

Following are descriptions of two projects funded in FY 1995:

- A cooperative agreement with NACCHO to develop a community needs assessment tool for determining health education and community involvement needs in communities affected by hazardous waste. NACCHO awarded grants to eight county health departments for development of a needs assessment tool and a subsequent pilot test.
- A cooperative agreement with Boston University through the Association of Schools of Public Health to provide an independent evaluation of how public

health agencies work successfully with communities. The project will assist the agency in defining community involvement strategies and developing recommendations for increasing the effectiveness of ATSDR's community involvement activities at Superfund sites.

Special Projects

Bloomington, Indiana, Polychlorinated Biphenyls (PCB) Project

The Bloomington PCB project began during FY 1993 in response to health concerns expressed by Bloomington area residents and because of a congressional request that ATSDR address any potential public health implications of incinerating PCB-contaminated soil associated with six hazardous waste sites in the Bloomington area.

In FY 1995, ATSDR published and distributed the final version of the *Proceedings of the Expert Panel Workshop to Evaluate the Public Health Implications of the Treatment and Disposal of Polychlorinated Biphenyls-Contaminated Waste*. This document includes the text of the workshop and responses to public comments received when the document was in draft.

Del Amo/Montrose, Torrance, California, Community Health Investigation

The purpose of this California investigation is to assess the current health status of residents living near the Del Amo/Montrose sites to implement public health interventions and preventive public health actions. The specific objectives are to conduct a community health investigation by providing residents access to medical practitioners with expertise in environmental and occupational medicine; to provide technical assistance to state and local public health agencies for assessing public health impacts; to build capacity in environmental medicine with the local health delivery system through physician residency training, individual consultations and training of medical practitioners, and continuing medical education; and to develop a public health framework for assessment of the health status of residents as related to environmental contamination exposures.

During FY 1995, more than 200 people living in the area potentially affected by the hazardous waste sites were screened for possible exposures to the site contaminants, particularly DDT. In addition, ATSDR staff members have participated in an advisory capacity in numerous meetings with the community, university staff, and environmental and health agencies involved with the Del Amo/Montrose sites. Community meetings have included regularly scheduled Del Amo Task Force meetings to work with the community on the design of the project, meetings of the Community Advisory Committee to the project, and other meetings requested by concerned residents. In addition, ATSDR has participated in meetings of the Clinical Policy Advisory Committee and the Health Evaluation and Education Advisory Committee for the project.

Verdese Carter Park, Oakland, California, Community Service Project

Verdese Carter Park covers approximately 3 acres in a low-income, minority, mixed commercial and residential area in Oakland, California. A wet and dry cell

battery factory occupied the southern half of the park from approximately 1912 until it was demolished in 1977. Operations at the battery factory ceased in the early 1970s. The northern half of the site was occupied by a greenhouse/nursery from around 1912 until the late 1960s or early 1970s. The City of Oakland acquired the battery factory and nursery properties in approximately 1975. Between 1976 and 1978, the city removed about 5,700 cubic yards of lead-contaminated soils before the park was built. The park is adjacent to an elementary school and historically was used as a playground by schoolchildren. In 1993 and 1994, more soil removals took place on the park property.

ATSDR has worked with other agencies involved with the site since additional contamination was discovered at the park in 1993. In FY 1994, ATSDR provided EPA with a public health consultation recommending that soils near the school and residential areas adjacent to the park be tested for lead contamination. Several oral health consultations were provided during FY 1995.

ATSDR received a request from the Alameda County Health Department and the Alameda County Lead Poisoning Prevention Program (ACLPPP) to provide a community service that would include blood lead screening for all residents in a defined area near the park. Individuals with elevated blood lead levels were referred to local health authorities for appropriate medical interventions or treatment. This project was a collaborative effort with EPA, the Alameda County Health Department, ACLPPP, the City of Oakland, and the local community. A citizens advisory panel was formed to provide input on the process and to assist in solicitation of participants. Three-hundred-ninety persons participated in the screening program conducted during August 1995. Participants were advised of their individual test results and also received an interpretation of the results.

Psychological Effects of Toxic Exposure

For the past 2 years, ATSDR has examined the possible effects of the stress of exposures to hazardous substances on psychological and physical health. The agency has investigated three situations under which the public could be affected by hazardous substances: chemical accidents, residence near a hazardous waste facility, or permanent relocation from a community because of a contaminated environment.

During FY 1995, ATSDR staff members continued to search the scientific literature for information about the neurobiologic, psychological, and social effects of possible exposures. A bibliography compiled from the search was made available to the public.

On September 12 and 13, 1995, in Atlanta, ATSDR and co-sponsors—the Substance Abuse and Mental Health Services Administration, Emory University's Rollins School of Public Health, and the State of Connecticut Department of Environmental Health—held The Expert Panel Workshop on the Psychological Responses to Hazardous Substances. Approximately 125 people attended. Three multidisciplinary panels of 10 experts each were convened to consider topics related to the psychological effects of hazardous substances: the biomedical and psychophysiologic consequences of stress

at the sites; the psychological and social variables involved in the genesis of these community stress responses; and development of public health strategies to prevent or mitigate the stress involved in living near a hazardous waste site. The overall charge to participants at the workshop was to promote an integrated approach to the neurobiologic, psychological, and social public health effects found in communities near hazardous waste sites. The outcomes of the expert panel workshop were 1) greater awareness among participants of the psychological needs of communities near hazardous waste sites, and 2) an outline of the foundation for intervention strategies to prevent excess stress at these sites.

Products to be developed include a proceedings of the conference, a scientific monograph for the peer-reviewed literature, a handbook for state and local public health officials, training courses for state and local public health practitioners on preventing and mitigating psychosocial stress in communities near hazardous waste sites, and a public health practice framework for community stress relief and prevention.

Economic Analysis

A collaborative project between ATSDR and the Joint Institute for Energy and Environment (JIEE) was designed to develop a comprehensive and integrated economic assessment methodology for assessing the direct and indirect public health costs of exposure to hazardous substances at hazardous waste sites. During FY 1995, JIEE developed the report *Estimates of Medical Costs and Lost Earnings from Illnesses Found at Elevated Rates in Populations Living Near Superfund Sites Contaminated with Volatile Organic Compounds*. Of the 402 sites with volatile organic compounds (VOCs)—which were identified as public health hazards—258 were identified with VOCs present in a water exposure pathway. About 1.7 million persons at risk for exposure were estimated; approximately 28,700 births would be expected to occur each year in that population. An excess economic health burden of \$390 million per year was estimated for treatment, long-term costs, and lost productivity associated with the conditions stroke, birth defects and anemia, diabetes, urinary tract infections, speech and hearing disorders, and skin disorders. This information was presented to ATSDR staff members; a collaborative report is being developed for publication in FY 1996.

Office of the Associate Administrator for Science

International Congress on Hazardous Waste

The Office of the Associate Administrator for Science (OAAS) organized, beginning in early FY 1994, sponsorship of the International Congress on Hazardous Waste: Impact on Human and Ecological Health by several federal agencies, international organizations, and professional societies. The meeting, held June 5-8, 1995, in Atlanta, was attended by more than 600 environmental public health professionals from 26 nations. Building on themes first discussed at the May 1993 Congress on the Health Effects of Hazardous Waste, this meeting included presentations on the impact of hazardous waste on the total ecosystem, reports of groundbreaking research on eco-

logic biomarkers, and discussion of the effects of environmental contaminants on lower order biota. Twenty-four plenary papers were delivered by nationally and internationally prominent scientists and policymakers; more than 160 presentations were made during 45 concurrent breakout sessions; and 80 posters were presented on the opening day. A proceedings is expected to be published in FY 1996.

ATSDR Board of Scientific Counselors

The ATSDR Board of Scientific Counselors provides advice and guidance to the administrator of ATSDR on agency programs to ensure scientific quality, timeliness, utility, and dissemination of results. (See Appendix J for a list of board members.) Specifically, the board advises on the adequacy of science in ATSDR-supported research, emerging problems that require scientific investigation, accuracy and currency of the science in ATSDR reports, and program areas to emphasize or de-emphasize. The board also recommends research programs and conference support for which ATSDR seeks to make grants to universities, colleges, research institutions, hospitals, and other public and private organizations. During the FY 1995 reporting period, the board made the following recommendations.

Mississippi Delta Project

ATSDR provided the board with a progress report on the Mississippi Delta Project. The board supported the project's progress to date and recommended early involvement of medical schools in the Delta region.

Physician and Community Education

ATSDR summarized its health education program and described its shift in emphasis during the past 2 years from educating health professionals to educating communities. The board strongly endorsed the importance of health education and discussed several options for the health education program. Board members emphasized the need to expand partnerships at the community level, maintain a strong focus in training health professionals, energize medical school participation at the community level, expand and apply new communication technology for cost-effective information exchange and "on-line" conferencing, address the issue of behavioral modification to improve health and safety, and expand industry partnerships.

Medical Surveillance Criteria

ATSDR provided an overview of its guideline for medical surveillance within the context of the agency's legislative authority for conducting medical monitoring. Three items were highlighted: (1) determining that an exposure has occurred, (2) screening populations at significantly increased risk of disease, and (3) referring people who screen positive to the general medical system for followup and treatment. The board asked ATSDR to provide periodic updates on this effort.

Psychological Impact of Hazardous Waste

ATSDR presented an overview of two activities in this area: a comprehensive literature review of the topic and the results of a meeting ATSDR held with representatives of other federal agencies involved with this issue (described previously in

this chapter). The board expressed support for ATSDR's approach and asked for regular progress reports.

ATSDR Peer Review Policy and Procedures

OAAS coordinates external peer review of all protocols, studies, and results of research carried out or funded by ATSDR. In FY 1995, 68 documents were peer reviewed, including 7 study protocols, 20 final reports, 19 grant application protocols, and 14 manuscripts for publication.

ATSDR Science Corner

The ATSDR Science Corner is a HyperText Markup Language (HTML) document (MENU) developed by OAAS to search the Internet for information resources that are free, in the public domain, and related to environmental health issues of concern to ATSDR and the environmental public health community. The primary focus of the Science Corner (Internet address: <http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html>) is to find and share global information resources on the relationship between human exposure to hazardous chemicals in the environment and adverse health effects. More than 45,000 accesses to the Science Corner were documented in FY 1995.

Office of Federal Programs

The Office of Federal Programs (OFF) was established to 1) plan, recommend, manage, and coordinate the policy and procedures under which ATSDR works with federal agencies in the development of toxicological profiles for unregulated hazardous substances found at federal facilities and in the conduct of public health assessments and other related health activities, such as surveillance, registries, health surveys, pilot studies, health education, health studies, and related research; 2) review the effectiveness and efficiency of all ATSDR federal program operations; 3) maintain liaison, negotiate, and coordinate with the federal departments where ATSDR is involved in federal programs; 4) manage the budget and human resources of all ATSDR federal program operations; and 5) monitor and prepare reports on all ATSDR federal programs. Details of federal program activities are discussed in the division-specific chapters.

Scope of Federal Programs

The EPA National Priorities List (NPL) dated September 1995 lists 1,290 sites on the Hazardous Waste Compliance Docket. Of these, 159 have been listed on, or proposed for listing on, the NPL. (See Appendix K for a list of federal facilities currently included on or proposed for the NPL). The NPL sites, which are dispersed throughout 41 states, Puerto Rico, and Guam, include 127 Department of Defense (DOD) sites, 20 Department of Energy (DOE) sites, 1 DOD/DOE site, 1 National Aeronautics and Space Administration (NASA) site, 2 NASA/DOD sites, 2 Department of Interior (DOI) sites, 2 Department of Transportation sites, 2 Department of Agriculture (DOA) sites, 1 EPA/National Oceanic and Atmospheric Administration site, and 1 Small Business Administration (SBA) site. There are 40 federal petition

sites: 27 are DOD sites, 8 are DOE sites, 2 are DOA sites, and there is 1 petition site each for SBA, DOI, and Bureau of Prisons. These sites have not been listed on or proposed for the NPL.

Memoranda of Understanding/Interagency Agreements

ATSDR currently has memoranda of understanding (MOU) or interagency agreements (IAG) or both with the following agencies: 1) DOD—MOU/IAG effective through September 2000; 2) DOE—MOU/IAG effective through November 1997; 3) DOI—MOU effective through September 1998; and 4) FAA—IAG effective through September 30, 1996. ATSDR is currently negotiating the establishment of additional agreements with NASA, the Bureau of Indian Affairs, and the U.S. Coast Guard.

Other Federal Activities

ATSDR, CDC, and DOE are developing a strategic plan for coordinating public health activities at DOE facilities. The focus of the plan is developing partnerships between the agencies and the public, assessing the health status of populations near DOE sites, intervening to mitigate or prevent adverse health effects, and planning and conducting work that is outcome oriented. A draft plan covering the ATSDR and DOE portions of the total plan has been completed.

On July 7, 1994, the Secretary of Health and Human Services signed the charter establishing the Citizens Advisory Committee on Public Health Service Activities and Research at Department of Energy Sites. The Federal Advisory Committee (FACA) established under this charter is authorized to create up to six site-specific subcommittees. Under the charter, ATSDR and CDC (National Center for Environmental Health [NCEH] and National Institute for Occupational Safety and Health) jointly administer the subcommittees; ATSDR and NCEH each manage three.

- The Hanford Health Effects Subcommittee (HHES), WA, the first established under this charter, operates under the principal administrative aegis of ATSDR through the Office of Federal Programs. ATSDR has not yet selected the two remaining sites; they will also be managed by federal programs personnel.

CDC/NCEH has established the following subcommittees:

- Savannah River Health Effects Subcommittee, GA
- Idaho National Engineering Laboratory Health Effects Subcommittee, ID
- Fernald Health Effects Subcommittee, OH

The subcommittees provide consensus advice to ATSDR and CDC pertaining to their public health activities and research at the respective sites.

ATSDR Washington Office

The ATSDR Washington office establishes a critical link between the agency and other executive and legislative branches of government in the Washington, DC, area. Through its Washington office, ATSDR is positioned to respond expediently to

issues raised by Congress and other federal and non-federal organizations that may affect agency programs. During FY 1995, the office represented the agency in numerous federal and non-federal forums.

Critical during 1995 were key meetings with congressional staff members seeking information about agency programs that could be affected by reauthorization of the Superfund law. Participants were congressional staff members from House and Senate subcommittees with jurisdiction over Superfund, ATSDR officials, and, usually, a representative from the Office of the Assistant Secretary for Legislation, Department of Health and Human Services. During Superfund Reauthorization hearings, the Washington office was liaison between the agency and subcommittee staff members in the departmental clearance of testimony and in followup after the hearings.

Courtesy visits by the ATSDR administrator and assistant administrator to members of Congress who are chairs or ranking minority members of authorization or appropriations committees and subcommittees were conducted to discuss agency programs and priorities.

During this reporting period, the Washington office coordinated special meetings with members of Congress or their staffs for updates on agency programs or projects funded in FY 1995, including these: health studies that identified adverse health effects associated with exposures to hazardous substances, the Bloomington (IN) PCB Incineration Project, the Great Lakes Research Initiative, the Silver Valley, Idaho, Superfund site, and the NGK Metals (PA) site. The office also provided monthly updates requested by a member of Congress about agency activities at the Fresh Kills Landfill, Staten Island, New York.

The office represented ATSDR in discussions with the Environmental Protection Agency; industry-sponsored groups, such as the Chemical Manufacturers Association and the Hazardous Waste Treatment Council; and public health advocacy groups, such as the Association of Occupational and Environmental Clinics, the National Association of County and City Health Officials, and the Association of State and Territorial Health Officials.

At the request of the U.S. Agency for International Development and the U.S. Information Agency, the Washington office provided briefings on agency programs to representatives of environmental agencies in other countries. During 1995, the office met with representatives from Santiago, Chile; Auckland, New Zealand; Buenos Aires, Argentina; Wan Chai, Hong Kong; and Sheyang, China.

Office of Policy and External Affairs

Congressional Testimony

The Office of Policy and External Affairs (OPEA) and other senior staff members of the agency respond to requests from congressional committees for information on a variety of issues. OPEA assisted in the preparation of the following congressional testimony:

Subcommittee on Superfund, Waste Control, and Risk Assessment of the Senate's Committee on Environment and Public Works on March 29, 1995, concerning ATSDR's public health actions and findings under the Comprehensive Environmental Response, Compensation, and Liability Act.

Subcommittee on VA, HUD, and Independent Agencies of the U.S. Senate's Committee on Appropriations on May 12, 1995, concerning the President's FY 1996 budget request for ATSDR.

Subcommittee on Commerce, Trade, and Hazardous Materials of the U.S. House of Representatives' Committee on Commerce on May 23, 1995, concerning reauthorization of the Superfund program.

Subcommittee on Water Resources and Environment of the U.S. House of Representatives' Committee on Transportation and Infrastructure on June 27, 1995, concerning reauthorization of the Superfund program.

International Health Activities

ATSDR continues to enhance its worldwide contacts through international research and exchange of information in areas of potential benefit to the Superfund program. During this reporting period, ATSDR received visitors from Egypt, India, Indonesia, Mexico, New Zealand, Sudan, and Wales. Topics of interest to the international guests included the agency's community involvement program, public health assessment process, managing hazardous materials incidents, toxicological profiles, and exposure registries.

Pan American Health Organization U.S.-Mexico Border Area Project

A memorandum of understanding (MOU) was signed in 1990 between ATSDR and the Pan American Health Organization (PAHO). Under this MOU, ATSDR provides technical assistance to Mexico and other PAHO member countries on issues pertaining to environmental health. To date, ATSDR's efforts have focused on building capacity—on both sides of the border—at the local, state, and federal levels.

ATSDR is working with health officials of Mexico to provide training in the area of public health assessments. As a result of this training, a public health assessment using the ATSDR methodology has been completed in Monterey, Mexico. High levels of aluminum were identified in an industrial hazardous waste landfill. Monterey health officials currently are working on another site suspected of containing high levels of lead.

ATSDR provided to PAHO, for distribution to member countries, copies of Spanish language translations for public health statements from 80 of the toxicological profiles.

The agency has also been involved in the development of training for PAHO/WHO member countries regarding acquisition of applied research data relevant to ATSDR's statutory responsibilities. A training course will be conducted in FY 1996 on access to environmental data on a variety of electronic databases.

Year 2000 Health Objectives

ATSDR has been an active participant in the Healthy People 2000 Project. The national health objectives that are the central part of this project grew out of a public health strategy initiated in 1979 with the publication of *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*. The objectives were expanded with publication in 1980 of *Promoting Health/Preventing Disease: Objectives for the Nation*, which set a national public health agenda for the 1980s. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*, which was released in September 1990, is the corresponding document for the 1990s.

ATSDR was assigned lead responsibility for tracking 4 of the 16 objectives described in the environmental health chapter.

During FY 1995, agency employees continued to serve as key members of the workgroup in tracking and developing strategies to implement the chapter objectives. Coordination continued with EPA, the National Institute for Environmental Health Sciences of the National Institutes of Health and with the CDC's National Center for Environmental Health and National Center for Health Statistics to advocate and monitor progress toward the objectives.

Much of the agency's 1995 activity for this project involved the review and, in some cases, the revision of the environmental health objectives that ATSDR is responsible for tracking. The review and revision were part of efforts to produce *Healthy People 2000 - Midcourse Review and 1995 Revisions*, which was published late in the year by the Public Health Service. Revisions were made to two objectives ATSDR is responsible for tracking. Potential exposure to solid waste contamination will now be monitored before and after recovery (recycling) to determine the impact of recycling and composting on reducing the levels of municipal solid waste generated per capita per day for the nation. The contaminated surface water objective also was modified because of changes in the way EPA collects information from the states.

Office of Regional Operations

The Office of Regional Operations (ORO) is responsible for assisting in the implementation of ATSDR's mandates at the regional level (see Appendix L for a map of ATSDR regions). ORO provides liaison, technical advice, and consultation to the EPA; other federal, state, and local agencies; and the public concerning environmental health issues. Using knowledge gained through firsthand experience, ATSDR's regional staff members participate in the development and implementation of all agency programs, activities, and initiatives. ORO recommends and coordinates the policy and procedures under which ATSDR works in the regions, and assists agency divisions and offices in meeting the regional goals and objectives of their individual programs.

Summary of Regional Operations Activity

ORO activities during FY 1995 included these:

- participated in development of 605 health consultations and 91 final public health assessments;

- represented ATSDR at 2,516 site meetings, including special strategy meetings, public meetings, and public availability sessions;
- conducted 231 site visits and 1,046 data reviews in response to petitions for public health assessments, health consultations, health studies, and other health-related activities; and
- provided 3,089 responses to written and oral requests for information, assistance, and training.

Response to Public Inquiries

An important component of ATSDR regional staff responsibilities is contact with the public on a wide range of topics associated with exposure to hazardous substances. ORO staff members respond daily to phone calls from the public about the safety of living near hazardous waste sites and the toxic effects of lead, and about reports of and concerns about clusters of cancer or other illnesses. Each phone call can generate additional coordination or limited research to provide an appropriate and timely response. Following are examples of hazardous waste sites to which ORO dedicated significant time and effort in FY 1995.

Big River, Desloge Pile, Missouri

Issue: This lead mining area is currently the highest-ranked National Priorities List (NPL) site in the United States. In addition to the large original site, five more mine tailing sites in the area have been scored for NPL listing.

Response: An exposure study is now being conducted in the area through funding ATSDR has provided to the Missouri State Health Department and subcontracted to the St. Louis University, the St. Francis County Health Department, and Mineral Area Community College. Regional staff members have coordinated ATSDR's activities with each of these organizations as well as with ATSDR headquarters. The regional staff has also participated in census gathering and recruitment activities for the control and study populations. Regional staff members have also participated in public meetings, strategy team meetings, advisory groups, and monthly public information meetings related to community assistance grants.

In a cooperative venture with the other agencies, regional staff members assisted in developing and implementing appropriate and effective health education activities for the community and for physicians. They also participated in field activities related to the indoor dust initiative. Activities at this site are continuing.

Everett Smelter Site, Washington

Issue: The site includes a residential community built on top of an old arsenic smelter. Arsenic levels in subsurface soil in residential yards approach 300,000 parts per million in some areas.

Response: In coordination with the Washington Department of Ecology, the Washington Department of Health, and the Snohomish Health District, ATSDR carried out one of the first exposure investigations by the agency's exposure investigation team. Urinary arsenic and hair arsenic measurements were followed by house

dust sampling. The data gathered through these efforts provided important information that area residents had requested. As a result of the information generated, two residences were determined to be unfit for habitation; the families were relocated to new homes.

ATSDR and the state also discussed the need for additional biomonitoring and a health status survey within the community; these proposed actions have been positively received within the community.

Fort Belknap Indian Reservation, Montana

Issue: Community members are concerned about health effects associated with the mining operations at this site.

Response: ATSDR has completed three health consultations; an ATSDR regional representative visited the reservation in September 1995. The representative explained the consultations and answered questions about the findings. Fact sheets were provided and other related material was discussed. The meeting generated requests for details on additional substances, information on cancer incidence, and possible participation in a school program.

The regional office plans another site visit and will continue to work closely with the people of Fort Belknap.

A petition for a health assessment of the site has been submitted to ATSDR. The regional office and ATSDR's Petition Response Branch have agreed to jointly conduct the site-scoping visit because of the regional office's considerable involvement to date.

North Meadows Landfill, Hartford, Connecticut

Issue: A state representative and a local community organizer requested that ATSDR evaluate possible health effects in the area near a municipal landfill in their community. The state was reviewing a permit application requesting expansion of the landfill, and local citizens were outraged. They felt that the landfill was causing respiratory problems and other chronic illnesses. The landfill accepted ash from a nearby municipal waste incinerator. The area is considered an environmental justice area because of the high number of low-income minority families.

Response: Regional staff members conducted a site visit and meetings with the community, completed a scoping report on the site, presented it to the ATSDR petition screening committee, requested air monitoring from the state, and made sure that health consultations on the site were in the state's cooperative agreement workplan. Regional staff members also provided liaison between the various federal and state agencies by organizing and managing meetings between EPA, the Connecticut Department of Environmental Protection, and ATSDR at critical decision points in the process. The site was scheduled for physician and community education follow-up activities. The EPA-New England Urban Environmental Initiatives Group considers ATSDR's work at this site positive and has requested the regional staff's input into its initiatives.

Office of Program Operations and Management

Budget and Personnel

The Office of Program Operations and Management (OPOM) develops and executes the agency's \$81 million budget, including Superfund and federal program funds. These funds support key ATSDR health-related activities, including public health assessments, emergency response, surveillance and health studies, toxicological profiles, registries, and health education. In FY 1995, OPOM directed disbursement of more than \$47 million (58%) of the agency's total budget to extramural programs through contracts, grants, and interagency agreements to support environmental health programs in state and local health and environmental departments, educational institutions, and other organizations serving public health.

In addition to managing ATSDR's budget, OPOM, after the recent merger with the Office of Information Resources Management, provides management support for the agency in the areas of recruitment; program planning and evaluation; information access, exchange, and utilization; training; travel; procurement; and other administrative services.

The breadth of ATSDR's activities in environmental public health demands that the agency find and hire personnel with exceptional skills. Although ATSDR operated under severe hiring constraints throughout FY 1995, OPOM was able to meet some of the skilled professional needs of the agency using alternative recruitment strategies to support a variety of research programs. Approximately 50 undergraduate and postgraduate students in hydrology, geology, engineering sciences, statistics, medical epidemiology, and environmental health were recruited and assigned to agency projects.

OPOM implemented an affirmative action program that by the end of FY 1995 resulted in a workforce with 27% minority representation and 56% female representation. Minority and female supervisory representation for FY 1995 were 16% and 33%, respectively. Minority women represented 20% (69 FTEs) of the women in the agency. In the GS-9 and above category, 5% (16) of minority women held professional or mid- to high-level administrative positions.

Databases

During the FY 1995 reporting period, OPOM worked to refine and enhance HazDat, ATSDR's comprehensive, on-line hazardous substance release and health effects database. This management information system provides cumulative data on the release of hazardous substances into the environment and the effects of hazardous substances on health.

Programming was continued this year to produce a priority list of hazardous substances found at DOE sites. Data were entered primarily on DOE site contaminants. HazDat now includes data from all agency program areas; analysis of that data assists the agency in determining program priorities and research needs in environmental health.

Development of the Federal Facilities Information Management System (FFIMS) continued throughout FY 1995. While HazDat stores and tracks data and information produced by the agency, FFIMS will collect, store, and analyze data from many sources. Integration of the two systems will facilitate the production of public health assessments, toxicological profiles, and other information products of the agency. FFIMS will be particularly useful during the development of public health assessments of large, federal hazardous waste sites where the amount of data that must be collected and analyzed is often overwhelming.

The FFIMS prototype, which was completed in FY 1995, is based on a relational database and a connection to the Internet. The system incorporates an Internet database directory, an Internet information browser, a link to the agency's ARC/INFO Geographic Information System, and the SAS statistical analysis system. The prototype assisted agency health assessors in the development of a public health assessment for one hazardous waste site and a public health consultation for another hazardous waste site. The second phase of FFIMS development began during FY 1995; the system is expected to be available for use by ATSDR staff members in FY 1997.

ATSDR on the Internet

The agency established a home page on the Internet in late FY 1994 (<http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html>). During FY 1995, a variety of ATSDR documents became available through the agency's World Wide Web (WWW) server, including public health statements from toxicological profiles, the ToxFAQs toxicological fact sheets derived from the public health statements, the *Hazardous Substances & Public Health* newsletter, and congressional testimony by ATSDR staff members. The WWW also provides access to portions of ATSDR's comprehensive, on-line hazardous substance release and health effects database, HazDat. The Internet version of HazDat, which debuted on ATSDR's WWW server in FY 1994, is frequently accessed by visitors to ATSDR's home page. More than 33,000 accesses to the Internet version of HazDat were logged during FY 1995. Because of its availability on the Internet, HazDat information is easily accessible to other federal agencies, state and local agencies, the scientific community, and the general public. The Internet version of HazDat will continue to be updated with more data and forms to help users retrieve information.

During FY 1995, more than 60,000 users accessed the ATSDR WWW server and nearly 462,000 requests for information were recorded. The number of requests recorded ranged from about 1,700 requests per week in early FY 1995 to more than 30,000 requests in each of the final 2 weeks of the year.



FY 1995 Completed Public Health Assessments and Public Health Advisories by State

Public Health Assessments

California

Frontier Fertilizer
Montrose Chemical Corp

Colorado

Hansen Container

Connecticut

Raymark Industries

Florida

Chevron Chemical Co. Inc., Ortho
Div.

Iowa

Mason City Coal Gasification

Louisiana

Agriculture Street Landfill
Lincoln Creosoting Co. Site
Pab Oil & Chemical Services Inc.

Michigan

Albion Sheridan Township Landfill
Bofors Nobel Inc.
Lower Ecorse Creek Dump
Packaging Corp. of America

Missouri

Weldon Springs Quarry/Plant/
Pits (US DOE)
Weldon Springs Ordnance Works
(Former)

Montana

BN Livingston Shop Complex

New Hampshire

Beede Waste Oil

New Mexico

Cal West Metals (SBA)

New York

GCL Tie & Treating
Liberty Industrial Finishing
Pollution Abatement Services
Rosen Site

Ohio

Chem-Dyne Corp.
Miami County Incinerator
Portsmouth Gaseous Diffusion
Plant (US DOE)

Oregon

Reynolds Metals Co.

Pennsylvania

Butz Landfill
East Tenth Street Site

South Carolina

Aqua-Tech Environmental Inc.
Palmetto Recycling Inc.
Rochester Property

Washington

Boomsnum/AIRCO
Commencement Bay - South
Tacoma Channel
Hanford 1100-Area (US DOE)

Wisconsin

Delavan Municipal Well #4

Public Health Advisories

Michigan

D&L Sales
H&K Sales



List and Status of Toxicological Profiles

Final toxicological profiles available in FY 1995

Acetone	Chloroform (UPDATE)
Acrolein	Chloromethane
Acrylonitrile	Chromium (UPDATE)
Aldrin/Dieldrin (UPDATE)	Chrysene
Aluminum	Cobalt
Ammonia	Copper
Antimony	Cresols
Arsenic (UPDATE)	Creosote
Asbestos (UPDATE)	Cyanide (UPDATE)
Barium	4,4'-DDD,DDE,DDT (UPDATE)
Benzene (UPDATE)	Dibenzo(a,h)anthracene
Benzidine (UPDATE)	Dibromochloropropane
Benzo(a)anthracene	1,2-Dibromoethane
Benzo(a)pyrene	1,4-Dichlorobenzene (UPDATE)
Benzo(b)fluoranthene	3,3'-Dichlorobenzidine
2,3-Benzofuran	1,1-Dichloroethane
Beryllium (UPDATE)	1,2-Dichloroethane (UPDATE)
Bis(2-chloroethyl)ether	1,1-Dichloroethene (UPDATE)
Bis(chloromethyl)ether	cis-, trans-1,2-Dichloroethene
Boron	2,4-Dichlorophenol
Bromodichloromethane	1,2-Dichloropropane
Bromoform	1,3-Dichloropropene
Bromomethane	Di(2-ethylhexyl)phthalate (UPDATE)
1,3-Butadiene	Di-n-butylphthalate
2-Butanone	Dinitrocresols
Cadmium (UPDATE)	Dinitrophenols
Carbon Disulfide	2,4- & 2,6-Dinitrotoluene
Carbon Tetrachloride (UPDATE)	1,2-Diphenylhydrazine
Chlordane (UPDATE)	Disulfoton
Chlorobenzene	Endrin/Endrin aldehyde
Chlorodibenzofurans	Ethylbenzene
Chlorodibromomethane	Ethylene oxide
Chloroethane	Heptachlor/Heptachlor epoxide (UPDATE)
	Hexachlorobenzene

Hexachlorobutadiene
Hexachlorocyclohexanes (UPDATE)
2-Hexanone

Isophorone

Lead (UPDATE)

Manganese
MBOCA
Mercury (UPDATE)
Methoxychlor
Methyl Mercaptan
Methyl Parathion
Methylene Chloride (UPDATE)
2-Methylnaphthalene
Mirex/Chlordecone
Mustard Gas

Naphthalene/Methyl Naphthalene
(UPDATE)
Nickel (UPDATE)
Nitrobenzene
Nitrophenol
N-Nitrosodimethylamine
N-Nitrosodi-n-propylamine
N-Nitrosodiphenylamine (UPDATE)

Pentachlorophenol (UPDATE)
Phenol
Plutonium
Polybrominated Biphenyls
Polychlorinated Biphenyls
(UPDATE):
Aroclor-1260, -1254, -1248, -1242, -
1232, -1221, and -1016

Polycyclic Aromatic Hydrocarbons
(UPDATE):
Acenaphthene, Acenaphthylene,
Anthracene,
Benzo(a)anthracene,
Benzo(a)pyrene,
Benzo(b)fluoranthene,
Benzo(g,h,i)perylene,

Benzo(k)fluoranthene,
Chrysene,
Dibenzo(a,h)anthracene,
Fluoranthene, Fluorene,
Indeno(1,2,3-cd)pyrene,
Phenanthrene, Pyrene

Pyridine

Radium
Radon

Selenium
Silver
Styrene

2,3,7,8-Tetrachlorodibenzo-p-dioxin
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (UPDATE)
Thallium
Thorium
Tin
Toluene (UPDATE)
Toxaphene
1,1,1-Trichloroethane (UPDATE)
1,1,2-Trichloroethane
Trichloroethylene (UPDATE)
2,4,6-Trichlorophenol
1,2,3-Trichloropropane

Uranium

Vanadium
Vinyl Acetate
Vinyl Chloride (UPDATE)

Xylenes (UPDATE)

Zinc (UPDATE)

CERCLA draft toxicological profiles

Carbon Disulfide (UPDATE)
Creosote/Coal Tars (UPDATE)
Diazinon
1,2-Dichloroethene (UPDATE)
Endrin/Endrin Aldehyde (UPDATE)
Hexachlorobenzene (UPDATE)
Methyl t-butyl ether (MTBE)
Selenium (UPDATE)
1,1,2,2-Tetrachloroethane (UPDATE)
Toxaphene (UPDATE)

**CERCLA draft toxicological profiles
(available for public comment on
October 17, 1995)**

Benzene (UPDATE)
Chlorfenvinphos
Chloroform (UPDATE)
Chlorpyrifos
Cyanide (UPDATE)
Dichlorvos
Nickel (UPDATE)
Polychlorinated Biphenyls (UPDATE)
Tetrachloroethylene (UPDATE)
Trichloroethylene (UPDATE)
Vinyl Chloride (UPDATE)

**CERCLA draft toxicological profiles
under development
(to be completed in FY 1996)**

Aluminum (UPDATE)
Cadmium (UPDATE)
Chloromethane (UPDATE)
Chlorophenols
Dichlorobenzene (UPDATE)
2,4-/2,6-Dinitrotoluene (UPDATE)
Dioxin
Ethylbenzene (UPDATE)
Formaldehyde
Hexane
Hexachlorocyclohexane (UPDATE)
Hexachlorocyclopentadiene
Hydrogen Sulfide
Manganese (UPDATE)
Phenol (UPDATE)
Sulfuric Acid

**U.S. Department of Defense
toxicological profiles final in FY 1995**

Automotive Gasoline
Diethyl Phthalate
1,3-Dinitrobenzene/1,3,5-
Trinitrobenzene
Fuel Oils
Jet Fuels (JP-4, JP-7)
Otto fuel II
RDX
Stoddard Solvent
Tetryl
2,4,6-Trinitrotoluene

**U.S. Department of Defense draft
toxicological profiles**

Di-n-octylphthalate
Ethylene and Propylene Glycols
Hexachloroethane
HMX
Hydraulic Fluids
Hydrazines
Mineral-based Crankcase Oil
Titanium Tetrachloride
White Phosphorus

**U.S. Department of Defense
toxicological profiles under
development in FY 1995**

2-Butoxy Ethanol
DIMP
Hexamethylene Diisocyanate
JP-5, JP-8
Methylene-di-aniline
Total Petroleum Hydrocarbons

**U.S. Department of Energy
toxicological profiles under
development in FY 1995**

Ionizing Radiation
Uranium (including depleted
uranium)



Minority Health Professions Foundation Institutions and Their Respective Studies

Florida A&M University

Effects of lead on glucocorticoid-regulated enzyme activity in cultured hepatocytes, lymphocytes, and neuroblastoma cells

Mechanisms of lead and cadmium toxicity

Martin Luther King/Charles R. Drew University

Inner-city environmental lead exposure and hypertension

Meharry Medical College

Acute and subchronic inhalation and oral toxicity testing of benzo(a)pyrene and fluoranthene

Morehouse School of Medicine

A longitudinal study of lead poisoning from maternal-infant relationship through early childhood

Texas Southern University

Assessment of organic, solvents-induced neurotoxicity in rats after acute and subchronic exposures

Studies of neurobehavioral toxicity of lead

The interaction and speciation of heavy metals with soil organic acids in simulated toxic waste site soil

Tuskegee University

Multigenerational studies of toxic effects of mercury and zinc in rats and mice

Xavier University

Multimedia study of lead, cadmium, zinc, and benzene in an urban environment

Neurotoxicology of subchronically administered zinc

Developmental toxicology of benzene in two species of fish

Developmental toxicology of benzene in rats and mice



ATSDR/MHPF Substance-Specific Applied Research Program Submitted Abstracts and Manuscripts

Abstracts

Acute Oral Toxicity of Benzo (a)
Pyrene and Fluoranthene

Acute Toxicity of Trimethyltin and
Acrylamide in Rats

Acute Oral Toxicity of Toluene and
Trichloroethylene in Rats

Acute Neurotoxicity of Trimethyltin
and Acrylamide in Rats

Antidotal Effects of Sodium
Thiosulfate in Mice Exposed to
Acrylonitrile

Attenuation of Dopaminergic Activity
in Nucleus Accumbens of Rats
Exposed to Lead

Cadmium Chloride-Induced DNA
Single Strand Breaks in Individual
Cells from Rat Organs

Dose and Sex-Dependent Distribution
of Mercury in Rats Exposed to
Mercuric Chloride

Effect of Zinc Oxide on Binding of a
Competitive N-Methyl-D-Aspartate
(NMDA) Receptor Antagonist

Effect of Pb DBH Activity in PC12
Cells

Effect of Pb on TH, DBH, Neurite
Outgrowth

Effect of Pb on TH, DBH, and PKC in
Both PC12 Cells and Mouse
Neuroblastoma Cells

Effects of Lead on Catecholamine
Biosynthesis in PC12 Cells

Environmental Health Effects in
Minority and Other Underserved
Populations: Benign Methods for
Identifying Lead Hazards at Day
Care Centers of New Orleans

Excitability of Female Rats after
Subchronic Exposure to Zinc Oxide

Geochemical Distribution and
Association Between Lead, Zinc, and
Cadmium in New Orleans Soils

Implications of Molecular Biomarkers
in Medico-Legal Toxicology

Lead May Affect Hormonal Induction
of Tyrosine Aminotransferase in
Cultured Hepatoma Cells Through
Inhibition of Protein Kinase

Mercury Levels in Target Organs of
Male Rats Following Multiple Doses
of Mercury

Microdialysis of a Cactus Plant To
Study the Uptake of Cadmium from
Contaminated Soil

Morehouse School of Medicine Lead
Study Project

Neurobehavioral Screening Battery
after Subchronic Zinc Oxide

Neurotoxicity of Toluene and
Trichloroethylene in Rats

Nitric Oxide Synthase: A New Target
for Environmental Toxicants?

Pb-Induced Reductions in Dopaminergic Activity in Rat Nucleus Accumbens: A Microdialysis Study

Plant Uptake of Cadmium Using Microdialysis in Atomic Absorption Spectrometry

Primary Prevention in Lead Dust-Contaminated Communities of New Orleans

Role of Cyclic GMP in the Neurotoxicity of Trimethyltin in Rats

Subchronic Pb-Exposure-Diminished In Vivo Release of Dopamine in Nucleus Accumbens

The Presence of Certain Toxic Heavy Metals Around a Selected Waste Site

Uptake and Transport of Heavy Metals in Plants Using In Vivo Microdialysis Sampling

Urban Geochemistry of Lead in New Orleans (USA): Wipe Methods for Assessing Surface Dust and Childhood Exposure

Manuscripts

Acute Toxicity of Toluene in Male and Female Rats: A Single Oral Dose Exposure Two-Week Study

Acute Toxicity of Trichloroethylene in Male and Female Rats: A Single Oral Dose Exposure Two-Week Study

Acute Neurotoxicities of Trimethyltin and Acrylamide in Male and Female Rats: A Single Exposure Two-Week Study

An Electrochemical Study of Gallic Acid and Its Interaction with Certain Heavy Metals in Aqueous Solution

Cadmium Chloride-Induced DNA Single Strand Breaks in Individual Cells from Rat Organs

Geochemistry of Built Environments: Processes, Patterns, and Effects on Health

Lead Dust at Elementary Public Schools: Comparison Between School Properties and Residential Neighborhoods of New Orleans

Low-Level Lead Exposure Decreases In Vivo Release of Dopamine in the Rat Nucleus Accumbens: A Microdialysis Study

Region-Specific Alterations in Dopamine and Serotonin Metabolism in Brains of Rats Exposed to Low Levels of Lead

Speciation of 3,4,5-Trihydroxybenzoic Acid with Cd(II)

The Acute Effect of Lead Acetate on Glucocorticoid Receptor Binding in C6 Glioma Cells

The Acute Effect of Lead Acetate on Glucocorticoid Regulation of Tyrosine Aminotransferase in Hepatoma Cells

The Effects of Lead On Dopamine Beta Hydroxylase Activity and Neurite Formation in PC12 Cells

Trace Metals and History: The Sediments of Bayou Saint John, New Orleans, LA, USA



Institutions Receiving Awards for Great Lakes Research and Their Respective Studies

Michigan Department of Health

Great Lakes Laboratory Quality Assurance/Quality Control Program

Michigan State University

Assessing Effects of Human Reproductive Health of PCB Exposure via Consumption of Great Lakes Fish
Health Risks from Consumption of Great Lakes Fish

New York State Department of Health

PCB, DDE, Mirex, and HCB Exposure Among Native American Men and Women from Eating Contaminated Great Lakes Fish and Wildlife

Research Foundation of State University of New York at Buffalo

The New York State Angler Cohort Study: Exposure Characterization and Reproductive and Developmental Effects

State University of New York at Oswego

Behavioral Effects of Consumption of Lake Ontario Fish: Two Methodologic Approaches (Continuation of Longitudinal Study Testing 2-, 3-, and 4-Year-Olds)

University of Illinois at Chicago

Great Lakes Fish as a Source of Maternal and Fetal Exposure to Chlorinated Hydrocarbons

University of Illinois at Urbana-Champaign

Longitudinal Assessment of Neuropsychological and Thyroid Function in Aging Great Lakes Fisheaters

University of Wisconsin-Milwaukee

Ojibwa Health Study II—Epidemiology, Laboratory Toxicology, and Outreach

Wisconsin Department of Health and Social Services

Consortium for the Health Assessment of Great Lakes Sport Fish Consumption



FY 1995 Acute Release Summary

In fiscal year (FY) 1995, ATSDR was involved in 59 acute release events (about a 10% increase in the number of events from the previous year) involving 647 injuries and impacting up to 31,629 other persons. There was a substantial increase in the number of injuries from FY 1994 to FY 1995 (647 compared with 128) and a substantial decrease in the number of other persons impacted (31,629 compared with 109,292).

Site Name	Location	ATSDR Region
Mass. Office Building	Boston, MA	I
Norwood Hospital	Norwood, MA	
MSO New York	New York, NY	II
St. Croix Pesticides	St. Croix, VI	
Transfer Station Fire	Rockville Center, MD	III
Aberdeen Tire Fire	Aberdeen, MD	
Edgewood Arsenal	Aberdeen, MD	
Allegheny Health	Pittsburgh, PA	
EPA Cont. Lifestyle Room	Philadelphia, PA	
Darby HCL	Upper Darby, PA	
Delaware Co. Ammonia	Delaware County, PA	
FAA Restrictions	Charleston, WV	
Lincoln Nitrates	Lincoln, AL	IV
Montgomery Truck Fire	Montgomery, AL	
CSX Derailment	Flomaton, AL	
Daytona Hth	Daytona, FL	
Bridge Fire	Marco Island, FL	
Dade County Mercury	Dade County, FL	
Space Coast Middle School	Port St. Johns, FL	
Atlanta Medical Waste	Atlanta, GA	
Americus Chlorine	Americus, GA	
Cobb County	Marietta, GA	
Atlanta Welder	Atlanta, GA	
Powell Duffryn Terminal	Savannah, GA	
Georgia EPD	Vienna, GA	
Equifax Building	Atlanta, GA	
Port Bienville Barges	Port Bienville, MS	

Site Name	Location	ATSDR Region
Charleston OBA	Charleston, SC	IV
Greenwood Nylon Fire	Greenwood, SC	
Tennessee Tire Fire	Campbell County, TN	
Tennessee Tire Fire	Memphis, TN	
Redi-Med	Ft. Wayne, IN	V
State Farm	Toledo, OH	
Dayton Concrete Sealer	Dayton, OH	
IHS Environmental Health Unit	Santa Fe, NM	VI
IHS Hospital	Santa Fe, NM	
White Sands Missile Range	White Sands, NM	
Carlsbad Hydrogen Sulfide	Carlsbad, NM	
Houston Ship Channel Fire	Houston, TX	
B&G Fertilizer	San Antonio, TX	
Reeves County Mercury	Pecos Reeves, TX	
T/b Dc 304	Corpus Christi, TX	
Toluene Barge	Corpus Christi, TX	
Jasper County Pesticides	Magnolia Springs, TX	
Alliance Fire	Irving, TX	
Eckrich Meats	Des Moines, IA	VII
Terra International	Sergeants Bluff, IA	
Lincoln Ethanol	Lincoln, NE	
Warehouse Fire	Lincoln, NE	
Nebraska Phosgene	Lodgepole, NE	
Hewlett Packard	Fort Collins, CO	VIII
Utah Tetrafluorhydrazin	Salt Lake City, UT	
Tucson Toluene	Tucson, AZ	IX
California Nitrites	San Jose, CA	
USCG Alameda	Oakland, CA	
Ulramar	Wilmington, CA	
Santa Fe Springs Fire Dept.	Santa Fe Springs, CA	
Torrance Acrylate	Torrance, CA	
Santa Monica Fire Dept.	Santa Monica, CA	



Glossary of Terms

Analyte

A chemical component of a sample to be determined or measured.

Applied Research

An investigative study, the results of which are used in actual practice.

Availability Session

An informal, drop-by meeting at which community members can meet one-on-one with ATSDR staff members to discuss health and site-related concerns.

Biological Indicators of Exposure Study

A study designed to use biomedical testing or the measurement of a chemical (analyte), its metabolite, or another marker of exposure in human body fluids or tissues to validate environmental exposure to a hazardous substance.

Biological Uptake

Biological uptake is the transfer of hazardous substances from the environment to humans. This may be evaluated through exposure measurement, such as personal air monitoring. More commonly, biological dose measurements are used to determine whether exposure has occurred. The presence of a contaminant, or its metabolite, in human biologic specimens, such as blood, hair, or urine, is used to confirm exposure and as an independent variable in evaluating the relationship between the exposure and the observed adverse health effects.

Carcinogen

Any substance that produces cancer.

CERCLA

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also known as Superfund. This legislation created ATSDR.

Clinical Fellows Program

A program in environmental medicine established by ATSDR that provides 1 to 2 years of stipend support for fellows to engage in applied research that helps prevent or mitigate the adverse health effects and diminished quality of life that may result from exposure to hazardous substances in the non-workplace environment.

Community Assistance Panel (CAP)

Community assistance panels are established to (1) facilitate constructive communication between ATSDR and the affected community; (2) provide an ongoing series of community-based meetings to ensure community involvement throughout the public health assessment process; and (3) provide information to ATSDR on the community's health concerns for inclusion in the public health assessment.

Comparison Values

Contaminant concentrations in specific media not likely to cause adverse health effects, given a standard daily ingestion rate and standard body weight.

Delivery to the Target Organ

A substance, toxicant, or its toxic metabolite must be delivered to the organ or tissue where it produces an adverse change. At this time, this component of the model of the progression from environmental contamination to appearance of health effects is the most difficult to evaluate, thereby providing the greatest opportunity for the development of molecular laboratory tests that may be used in field studies.

Disease

Disease is the unhealthy state characterized as a condition diagnosable by a physician.

Environmental Characterization Data

Information provided in site-specific reports on environmental contamination and environmental pathways.

Environmental Contamination

Environmental contamination is defined as the presence of hazardous substances in the human environment. How the contamination may contact humans is evaluated by defining the pathways of human exposure. The presence and concentrations of hazardous substances are measured by chemical analysis of the contaminated media, for example, water used for potable and recreational purposes and soil, air, and food, and by pathways of exposure, such as ingestion, inhalation, and absorption. The ATSDR public health assessment defines the pathways of exposure and forms the primary basis for making decisions about conducting human health studies.

Exposure Dose Reconstruction

An approach that uses computational models and other approximation techniques to estimate cumulative amounts of hazardous substances internalized by people at presumed or actual risk from contact with substances associated with hazardous waste sites.

Exposure Investigation

The collection and analysis of site-specific information to determine if human populations have been exposed to hazardous substances. The site-specific information may include environmental sampling, exposure-dose reconstruction, biologic testing, and existing medical information. The information from an exposure investigation is included in public health assessments, health consultations, and public health advisories. Exposure investigations are designed to give environmental public health professionals the exposure information needed to improve their public health decision making.

Exposure Registry

An official roster of persons exposed to hazardous substances. The registry evolved from the need for fundamental information about the potential impact on human health of long-term exposure to low and moderate levels of hazardous substances.

Geographic Information System (GIS)

A computer hardware and software system designed to collect, manipulate, analyze, and display spatially referenced data for solving complex resource, environmental, and social problems.

Hazardous Substances and Health Effects Database (HazDat)

The administrative and scientific database developed by ATSDR to manage data collection, retrieval, analysis, and utilization through the sophisticated technologies provided by computers. HazDat allows users to locate information on the release of hazardous substances into the environment, and to ascertain the effects of hazardous substances on health with uniformity, efficiency, and precision.

Hazardous Waste Worker Surveillance

Activities that evaluate workplace exposure or trends in adverse health effects over a specified period. Because hazardous waste workers are potentially exposed to higher concentrations of contaminants, researchers can use information gathered from this population to evaluate a range of exposures.

Health Consultation

A written or oral response from ATSDR to a specific request for information about health risks related to a specific site, chemical release, or hazardous material. To prevent or mitigate exposures, consultations may lead to specific actions, such as restricting use of, or replacing, water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

Health Investigation

Any investigation of a defined population, using epidemiologic methods, that would assist in determining exposures or possible public health impact by defining health problems requiring further investigation by means of epidemiologic studies, environmental monitoring or sampling, and surveillance.

Health Outcome Data

A major source of data for public health assessments. The identification, review, and evaluation of health outcome parameters are interactive processes involving the health assessors, data source generators, and the local community. Health outcome data are community specific and may be obtained from databases at local, state, or national levels, as well as from data collected by private health care organizations and professional institutions and associations. Data may be drawn from morbidity and mortality databases, birth statistics, medical records, tumor and disease registries, surveillance databases, and previously conducted health studies.

Health Outcomes Study

An investigation of exposed persons designed to assist in identifying exposure or effects on public health. Health studies also define the health problems that require further inquiry by means of, for example, a health surveillance or epidemiologic study.

Health Surveillance

The ongoing and systematic collection, analysis, and interpretation of health data while monitoring a health event.

Minimal Risk Level (MRL)

An estimate of daily human exposure to a chemical likely to be without an appreciable risk of deleterious effects (noncancer) over a specified duration of exposure.

National Exposure Registry

A list of persons exposed to hazardous substances. This list is composed of chemical-specific subregistries. The primary purpose of the registry program is to create a large database of similarly exposed persons to facilitate epidemiologic research to determine adverse health effects in persons exposed to low levels of chemicals over a long period.

National Priorities List (NPL)

A list of hazardous waste sites that have undergone preliminary assessment and site inspection to determine whether they pose immediate threats to persons living or working nearby. The sites on this list, which is promulgated by EPA under CERCLA, are considered most in need of cleanup.

National Toxicology Program (NTP)

NTP conducts toxicologic testing on the substances most frequently found at sites on the NPL (see previous term), and which also have the greatest potential for human exposure.

Petitioned Public Health Assessment

A petitioned public health assessment is a public health assessment conducted at the request of a member of the public. When a petition is received, a team of environmental and health scientists is assigned to gather information to determine, using standard public health criteria, whether there is a reasonable basis for conducting a public health assessment. Once ATSDR confirms that a public health assessment is needed, the petitioned health assessment process is essentially the same as the public health assessment process.

Physiologic Change

The toxicant may produce structural or functional changes in humans that may be transient or permanent; the changes may or may not be predictive of the development of disease. Changes in structure or function of an organ or tissue that may be predictive of disease, whether transient or permanent, should be considered undesirable.

Public Comment

An opportunity for the general public to comment on agency findings or proposed activities. The public health assessment process, for example, includes the opportunity for public comment as the last step in the draft phase of the public health assessment document. The purposes of this activity are to 1) provide the public, particularly the community associated with a site, the opportunity to comment on the public health findings contained in the public health assessment, 2) evaluate whether the community health concerns have been adequately addressed, and 3) provide ATSDR with additional information.

Public Health Action

A public health action is designed to mitigate or prevent adverse health effects in populations living near hazardous waste sites or releases. Public health actions are identified from information developed in public health advisories, public health assessments, and health consultations. Those actions include dissociating persons from exposure (e.g., providing an alternative water source), conducting biologic indicators of exposure studies to assess exposure, and providing health education for health care providers and the community. These actions are determined by ATSDR's Health Activities Recommendation Panel (HARP).

Public Health Advisory

A statement of findings that a substance released into the environment poses a significant risk to human health. It also includes recommended measures to reduce human exposure and eliminate, or substantially mitigate, significant risk to human health.

Public Health Assessment

A written evaluation of available data and information on the release of hazardous substances into the environment in a specific geographic area. The evaluation is used to assess any pertinent current or future impact on public health. Before writing a public health assessment, ATSDR staff members review detailed information about the area or site (for example, physical, geographic, historical, and operational setting of the site; environmental contamination and physical hazards at the site; potential pathways for additional environmental contamination and human exposure to hazardous substances; demographics and concerns of the community surrounding the site; and available health outcome data) and determine whether, and to what extent, people have been exposed to hazardous substances.

Public Health Statement

The first chapter of an ATSDR toxicological profile. It is intended to be a health effects summary written in lay language for the target audience, that is, the general public, especially people living in the vicinity of a hazardous waste site or chemical release.

Registry of Toxic Effects of Chemical Substances (RTECS)

An information system that lists acute and chronic effects of more than 100,000 chemicals. It also includes data on skin and eye irritation, carcinogenicity, mutagenicity, and reproductive consequences.

Significant Human Exposure Levels (SHELs)

A new health risk assessment tool used to assist the health assessor in making determinations about human health risks by defining exposure levels believed to cause adverse health effects.

Site-Specific Surveillance

The systematic collection, analysis, and interpretation of health data from persons residing near hazardous waste sites.

State-Based Surveillance Systems

A variety of diverse databases used by state health departments for purposes such as mandatory registration of vital events or municipal water testing.

Superfund

Another name for the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), which created ATSDR. See CERCLA.

Technical Assistance

A technical assist is a written or oral response by ATSDR to requests for technical information and public health recommendations. Information provided is frequently incorporated into a health consultation.

Toxicokinetics

The science that deals with the absorption, distribution, metabolism, and excretion of harmful substances, especially analysis of the concentration of such substances over a specified period.

Toxicological Profile

A document about a specific substance in which ATSDR scientists interpret all known information and specify the levels at which people may be harmed if exposed. The profile also identifies significant gaps in knowledge about the substance and serves to initiate further research, when needed.

TOXNET

A computer network established to maintain an inventory of literature, research, and studies on the health effects of toxic substances.

Volatile Organic Compounds

Substances containing carbon, hydrogen, and oxygen that easily become vapors or gases.



ATSDR Health Studies Nearing Completion or in Progress

Results of the following studies that are nearing completion or are in progress are expected to be released in FY 1996. Epidemiologic studies typically take 3 to 5 years to complete; findings discussed in this summary are based on results to date and are subject to change.

Otis Air National Guard Base, Mashpee, Massachusetts

At the Otis Air National Guard Base near Mashpee, Massachusetts, data collection, including a disease-and-symptom questionnaire and biomedical testing, was conducted among selected persons living in four neighborhoods; two of the neighborhoods were in an area with groundwater contaminated by volatile organic compounds. Residents of the other two neighborhoods were concerned about air emissions from the base. Analysis of the data was completed in FY 1995. The results of the disease-and-symptom survey showed that diseases were reported slightly more often in the target areas than in the comparison areas, and that symptoms were reported more than twice as often by the target population. No pattern of specific health effects was identified.

United Creosoting Company NPL site, Texarkana, Texas

From 1946-1972, the United Creosoting Company NPL site was the location of a wood treatment facility; after the facility closed, a subdivision containing about 225 residents was constructed on the site. In the early 1980s, contamination of the soil and groundwater with polycyclic hydrocarbons, pentachlorophenol, and chlorinated dioxins/dibenzofurans was discovered; completed exposure pathways include ingestion and skin contact with contaminated soil and groundwater. Residents of the community believe they have an excess of skin rashes, cancer, and other health outcomes.

The Texas Department of Health (TDH) has conducted surveillance using a disease- and symptom-prevalence questionnaire for 3 years. These results, which are now being analyzed, will be compared to those found in a Texarkana community with a similar PAH exposure that was previously investigated by TDH.

Birth Defects and Reproductive Disorders

The California Birth Defects Monitoring Program (CBDMP) and the New York State Department of Health (NYSDOH) are investigating associations between residential proximity to hazardous waste sites during the periconceptual period (3 months before conception through the first trimester) and selected birth defects. In these studies, the locations of births and hazardous waste sites are identified on a map. In addition, site environmental data are used to determine the classes of chemicals on site, and to rank the sites by exposure potential. In a separate study, CBDMP also

will evaluate whether ethnic differences in the prevalence of birth defects are related to residential proximity to hazardous waste sites. The NYSDOH study will evaluate maternal exposure to volatile organic compounds (VOCs) and cardiovascular malformations. Besides hazardous waste site data, interviews will be used to estimate maternal exposure to VOCs from hazardous waste sites, other environmental sources, and the workplace.

Three studies are evaluating drinking water contamination and selected adverse reproductive outcomes. ATSDR funded the CDC National Center for Environmental Health to follow up a previous study's finding of associations between several reproductive outcomes and contaminated public drinking water wells in Woburn, Massachusetts. The New Jersey Department of Health is studying drinking water contamination and neural tube defects; environmental sampling of homes and interviews of case and control mothers began in June 1993. ATSDR developed a proposal in FY 1994 to study adverse pregnancy outcomes at the US Marine Corps Base at Camp Lejeune, North Carolina. This intramural project will look for association between VOC exposures in drinking water and the outcomes small for gestational age, preterm delivery, and fetal death.

Cancer of Selected Anatomic Sites

Several current ATSDR studies are addressing whether or not a population around a specific site or group of sites has an increased incidence of cancer (for example, Maywood Area Cancer Investigation, New Jersey; Study of Cancer Incidence Near Solvents Recovery Services of New England, Connecticut; Lung Cancer Mortality Study in Smelter Communities, Arizona; MBOCA Analytic Epidemiologic Study, Michigan; Cancer Occurrence by Common Drinking Water Source, 1981-1990, Broome County, New York; Incidence of Various Types of Cancer and Adverse Pregnancy Outcomes, Ottawa Radiation Site, Illinois). Three studies are attempting to develop methods for using geographic information system (GIS) technology for surveillance of cancer incidence around sites (Study of Selected Cancers at NPL Hazardous Waste Sites, Pennsylvania; Use of GIS in the Evaluation of Health Data, Stratford, Connecticut; Off-Gassing Landfills and Cancer Incidence, New York), and will provide data on individual sites or groups of sites with similar contaminants.

Work continued in FY 1995 on establishment of a state-based surveillance system for primary brain cancers. The system has received data from cancer registries in six states (California, Florida, Massachusetts, New York, Pennsylvania, and Virginia); all of the states have Department of Defense (DOD) installations listed on the NPL. Data are being address-matched for spatial analysis. The system will analyze trends in the occurrence of brain cancers in populations residing around DOD installations and other NPL sites by using GIS to examine the distribution of primary brain cancer in states.

Massachusetts Military Reservation - Upper Cape Cod Cancer Review

This project evaluates cancer incidence data for Upper Cape Cod. Descriptive statistics for area towns have indicated that the incidence of some types of cancer has

been significantly greater than expected, and the community has been concerned about the possible link between cancer incidence and the Massachusetts Military Reservation. The analysis is being conducted by the Massachusetts Department of Public Health and assesses the population that lived in five towns (Barnstable, Bourne, Falmouth, Mashpee, and Sandwich) between January 1982 and December 1990. The data are being analyzed for 25 different cancer types; standardized incidence ratios are being calculated. The review is descriptive, to determine if excesses exist, and does not attempt to correlate cancer incidence with specific environmental exposures. In 1995, a draft report was submitted for peer review and review by the local community assistance panel.

Louisiana Database Project State-Based Surveillance

This project is utilizing GIS technology to create a surveillance system by linking state health outcome databases in Louisiana with appropriate environmental databases. The resulting surveillance system will allow identification of specific areas of exposure and increased disease prevalence throughout the state and, subsequently, appropriate analytic epidemiologic investigations. Tumor registry and vital statistics (births and deaths) data for the Mississippi parishes have been added to the system. A demonstration project of birth outcome data and proximity to three Superfund sites was completed in one parish.

Immune Function Disorders

Environmental Exposures and Their Effects on the Immune System *University of North Carolina*

ATSDR is currently working with the University of North Carolina to determine the effects on the immune system of residential exposure to an NPL Superfund site. A battery of tests will be conducted to assess nonspecific, cell-mediated, humoral immune competence and mutagenic potential of exposure to such sites. In FY 1994, telephone eligibility interviews were completed and plans for blood testing were developed. In FY 1995, blood testing was initiated.

B-Cell Lymphocytosis

Since 1991, the Basic Immune Test Battery (BITB) has been used to measure possible immune system dysfunction in populations residing near hazardous waste sites. The BITB has been applied to about 5,000 participants at 10 different Superfund sites. The lymphocyte phenotyping panel of the BITB includes a comprehensive array of markers for the major families and subfamilies of lymphocytes, including T cells, B cells, natural killer cells, and CD4 helper cells.

ATSDR investigators are investigating a finding that emerged from the preliminary analysis of this combined data set: the presence of lymphocyte phenotypes that have been associated with B-cell chronic lymphocytic leukemia (CLL) in participants living near target sites contaminated by VOCs. These individuals were asymptomatic and other laboratory findings were generally unremarkable. Thus, the BITB lymphocyte panel seems to be a singular marker of subclinical CLL in these

cases. The presence of several CLL-like phenotypes in target populations around Superfund sites contaminated with VOCs raises the question of whether long-term exposure to these chemicals has increased the risk of developing the disease. Additional research involving improved laboratory methods and more focused epidemiologic investigations will be needed to answer that question.

Multiple Chemical Sensitivity

(Note: ATSDR recognizes that there may be other pathophysiologic mechanisms associated with this syndrome; ATSDR's work in this area is included here because the potential for an immune function mechanism can be related to the agency's priority health conditions.)

Under ATSDR's auspices, the California Department of Health Services in FY 1994 developed draft questionnaires and a panel of laboratory tests that can be used to study the development of multiple chemical sensitivity in the aftermath of a chemical spill. A final questionnaire was completed by an expert panel during FY 1995. To assess the prevalence of this condition in the general public, screening questions from the questionnaire were included in California's 1995 Behavior Risk Factor Survey.

Lung and Respiratory Diseases

Caldwell Systems Inc. Site, North Carolina Follow-up Study

A cross-sectional symptom-and-disease-prevalence study was first conducted at the site in 1991-1992. The results demonstrated significantly higher prevalences of irritant, respiratory, and neurologic symptoms in the target area. The current follow-up study was conducted in 1993 to perform an in-depth examination of the respiratory, neurologic, and immune effects reported by target area residents from the first study. Two-hundred-sixty residents who participated in the first study were examined again (52 in the target symptomatic group, 96 in the target asymptomatic group, and 112 in the comparison group). Pulmonary function tests, an adult environmental neurobehavioral test battery, an immune test battery, and a questionnaire were employed in the study. This study is undergoing peer review and will be complete in FY 1996.

Ralph Gray Trucking, Westminster, California

Site-specific surveillance for respiratory diseases and symptoms began in August 1994 in Westminster, California, where mercaptan and other sulfur compounds are being remediated. Approximately 70 households participated in a baseline survey before remediation; 40 individuals were included in a 3-month followup.

Burlington Northern Train Derailment, Douglas County, WI

The Wisconsin Department of Health (WDOH) proposed to investigate the prevalence and incidence of health complaints to identify possible risk factors and provide residents with a clearer understanding of their community's health and the health impact of the June 1992 train derailment. The survey has been completed and the data are being analyzed. A protocol is being written for submission to ATSDR

for peer review, and documents are being prepared for institutional review board approval.

Funding for the second year has been approved. In year two, WDOH will identify 100 members of the community who reported during the telephone survey that they were affected by the spill. Follow-up studies will be conducted on affected individuals and on exposure-matched controls to identify factors common to persons affected by the spill. Community intervention strategies will be developed to address factors associated with the spill.

Neurotoxic Disorders

Groton Gratuity, Groton, MA

The Massachusetts Department of Health is investigating the prevalence of learning and behavioral disabilities in children and young adults living in an area with groundwater contaminated with low levels of TCE and TCA. In a cross-sectional investigation of a target and comparison community, comparison-area residents were matched to current and past residents of the target area on the basis of age, sex, and socioeconomic status. Health outcome assessments consisted of a neuropsychological assessment and an interview. The grantee is currently addressing peer review comments of the draft final report.

Studies with Multiple Health Outcomes

Study of Current and Former Residents, Silver Valley, Idaho

In response to community concerns about the possible long-term adverse health effects resulting from childhood lead exposures, ATSDR is conducting a health study of persons who were children living in the area around the Bunker Hill lead smelter in 1974. This concern is supported by elevated blood lead levels in the area during the 1970s. Using birth and school records, ATSDR established a cohort of children who were 9 months to 9 years of age in 1974 or 1975. ATSDR assessed the functional capacity of both the central and peripheral nervous systems of a subsample of both the exposed and non-exposed subjects using a battery of neurologic tests. Kidney function was also measured. Reproductive effects were determined by questionnaire responses only. K-XRF was used to determine the total body burden of lead.

Data collection was completed in September 1994. The total number of eligible exposed and non-exposed subjects who completed telephone interviews was 917 and 754, respectively. The response rates were 90.7% and 61.7% among the exposed and non-exposed subjects who completed the telephone interview. This study is expected to be completed in FY 1996.

Study of Female Former Workers, Bunker Hill Lead Smelter, Silver Valley, Idaho

ATSDR has completed a study investigating the interaction between lead and osteoporosis in women who were employed at the Bunker Hill lead smelting facility in the 1970s. This study will provide information about lead mobilization during

physiological states of high bone turnover, such as menopause. The study compared women who were formerly employed at the facility with a comparison group of women in Spokane, Washington. Data collected included biochemistry panels, bone density measurements, blood lead levels, body burden of lead using XRF, urine and blood measurements of bone turnover, and an interview. The interview included questions on reproductive history and menopausal status. Data analysis was completed in FY 1995; the final report has been submitted for peer review and will be released in FY 1996.

Studies Evaluating for Exposure Risk Factors

Times Beach, Missouri

The purpose of this project is to assess human exposure to 2,3,7,8-TCDD resulting from incineration of dioxin-contaminated soils and other materials in Times Beach, Missouri. The objectives of the study are (1) to determine whether residents living adjacent to the Times Beach site have higher background blood concentrations (pre-incineration) of TCDD than residents from a comparison community and (2) to determine whether post-incineration TCDD blood concentrations in the target population increase significantly from the pre-incineration levels. This will be accomplished by selecting a random sample of residents from the target and comparison areas, conducting interviews, and collecting blood specimens both before initiation of the incineration and at 6 and 12 months after incinerator operations begin. Investigators also plan to collect and analyze vegetables, yard soils, and milk and blood specimens from cattle for concentrations of dioxins to estimate uptake and the risk of human exposure through these routes.

The first blood specimens were collected the week of September 11-16, 1995. There were 76 participants from the target area and 74 from the comparison area. The second collection of blood specimens is scheduled for April 1996. The emission burn from the site occurred in November. The projected date for the production burn is early 1996.

Sheboygan River site, Wisconsin

To investigate if people are eating fish from the PCB-contaminated Sheboygan Harbor and river, an exposure investigation was conducted among three Sheboygan area subpopulations. Included in the survey were people who fish in the Sheboygan River, Sheboygan Hmong households, and participants in the Sheboygan Women, Infants, and Children program to determine fish consumption practices, particularly fish caught from the Sheboygan River. A draft final report has been submitted for ATSDR review and peer review.

Tri-State Mining Lead Screening Project, Ottawa County, Oklahoma

This blood lead screening project resulted from a September 1994 ATSDR recommendation for biological testing, community health education, and health professional education at this site. The purpose is to provide ongoing blood lead testing and to identify residents of Ottawa County in the target area with elevated blood

lead levels and refer them for appropriate medical intervention and treatment if needed. First priority is children ages 6-72 months and pregnant women in the five communities in Ottawa County. Repeat blood lead tests, family education, and general community education have been conducted.

Allied Paper/Portage Creek/Kalamazoo River

In accordance with an ATSDR recommendation, the Michigan Department of Public Health (MDPH) proposed a two-phased study of persons who fish at the Allied Paper/Portage Creek/Kalamazoo River Superfund site. The goal was to conduct a fish consumption survey and perform biomonitoring on a subset of the population exposed to polychlorinated biphenyls, mercury, and DDE. Phase I consisted of a survey of sport fishermen to identify the size of the fishing population in the Kalamazoo River and Portage Creek areas. Study participants were recruited by interviewing on river banks and during a "float trip" on the river. A questionnaire was used to identify fish consumption patterns and to assess awareness of the sport fish consumption advisories. Approximately 940 fishermen participated in the survey. Data analysis was completed and preliminary results have been reviewed.

Phase II was designed to determine if exposure to PCB, mercury, and DDE were occurring at levels of public health concern. Activities included collecting blood samples to test for PCB, mercury, and DDE, and obtaining medical histories of previously surveyed anglers. Field portions of the study have been completed in Kalamazoo and Allegan counties. A total of 155 individuals have provided blood samples for analysis. Laboratory analyses have been completed. However, a review of the initial gas chromatographic analyses indicated that some specimens needed additional dilutions and reanalysis.

Carson River Mercury Exposure Study, Nevada

The purpose of this study is to assess human exposures to mercury contamination at the Carson River Mercury site. Blood and urine levels of mercury have been measured and compared for 2 groups of 398 residents living within 4,000 feet and outside 6,000 feet of the site. Potential risk factors were also examined. Results of the draft study report submitted by the Nevada state health department in May 1994 indicate that all observed mercury levels (total mercury content) in blood and urine were below levels of concern (20 parts per billion [ppb] in urine, 30 ppb in blood). ATSDR has requested the data to conduct its own analysis and develop a final report.

Biological Monitoring of Arsenic in Children Living Near a Hazardous Waste Incinerator, Massachusetts

The study purpose is to determine whether children living near a hazardous incinerator may experience increased arsenic exposure after the incinerator starts operation. Urine and hair samples of approximately 300 children in the area will be collected before and after incineration begins; arsenic levels in hair and urine among those children will be measured during the two periods and compared. The pre-incineration sample collection phase was completed in February 1994. About 10% of

samples were re-collected from the subjects in October 1995 to determine why there were no substantial variations. The post-incineration test phase will be carried out when data needed to initiate incineration are available.

Lead and Mercury Exposure Screening of Children in Pompton Lakes, New Jersey

The activity is designed to use biomedical testing to validate environmental exposure to hazardous substances that have migrated off site. The purposes are (1) to determine potential exposures of a sensitive population (children) to lead and mercury using biological monitoring of blood and urine; (2) to obtain a high percentage of participation in the study; and (3) to provide information on the project and its outcome to residents and local, county, state, and federal health officials.

National Exposure Registry

Impact of TCE Exposure on Oral Motor, Speech, and Hearing Function in Children

In the Trichloroethylene (TCE) Subregistry baseline technical report, the number of children under age 10 reported to have speech and hearing problems was significantly higher than the expected number, based on a comparison of subregistry data with national norms (the National Health Interview Survey). According to the literature, at higher levels, TCE exposure has been shown to adversely affect the cranial nerves that control oral motor, speech, and hearing (OSH) function in adults. The University of South Carolina School of Public Health, in cooperation with ATSDR, will conduct a prospective study of OSH impairment for children in the TCE Subregistry who were younger than 10 years at baseline to examine the impact of low-level, long-term TCE exposure, during human development, on OSH performance. Exposed children from the subregistry and an age-matched control group will be given indepth assessments. Available records and a questionnaire will be used to characterize exposure and to identify potentially confounding factors. The prevalence and severity of OSH impairments among TCE-exposed children and non-exposed children will be compared. The prevalence of speech and hearing problems among exposed children since the baseline survey will also be examined.



FY 1995 Community Health Education Sites by State or Tribe

ALABAMA

Perdido Groundwater

Redwing Carriers

ARIZONA

Nogales

Tucson International Airport

ARKANSAS

Arkwood Inc.

Gurley Pit

Jacksonville Municipal Landfill

Popile Inc.

Rogers Road Municipal Landfill

Vertac Inc.

West Memphis Landfill

CALIFORNIA (Health professionals education only)

Del Amo Montrose Chemical

Ralph Gray Trucking
aka Westminster Tract #2633

COLORADO

ASARCO Globe

Boulder Groundwater
(North Broadway Plume)

Francisco Lane Pesticide

Idarado

Layton Drums aka Hansen Container

Leadville

Smelertown Site

Summitville Mine

CONNECTICUT

Air Quality Petition Site

Beacon Heights Landfill

Durham Meadows

Kellogg/Deering

Laurel Park Inc.

Linemaster Switch

North Meadows

Old Southington Landfill

Raymark/Stratford

Solvents Recovery

Starr Property

EIGHT NORTHERN INDIAN PUEBLOS COUNCIL (ENIPC)

Eight Northern Pueblos (NM)

ELY SHOSHONE

Ely (NV)

FLORIDA

Hipps Road Landfill

Wingate

Escambia

Chevron Chemicals

American Creosote

Peak Oil

GEORGIA

LCP Chemical

IDAHO

Bunker Hill
Coeur D'Alene
Silver Valley
Triumph Tailings Pile

ILLINOIS

LaSalle Electric Utilities

IOWA

Fairfield Coal Gas
Labounty Dump
Mid-America Tanning
Shaw Avenue Dump
White Farm Equipment

KANSAS

57th & N. Broadway
Kansas Groundwater
Contamination Sites
Navarre Groundwater
Ramona Groundwater
Tri-State Lead Sites

LOUISIANA

Agriculture Street Landfill
American Creosote Company
Bayou Bonfouca
Cleve Reber
Devil's Swamp
Dutchtown Treatment
Lincoln Creosote
Old Citgo Refinery/Oxychem
Old Inger Oil
Petro-Processors of Louisiana
Thompson Hayward Chemical

MASSACHUSETTS

Baird & McGuire
Blackburn/Union Privileges
Charles George
Groton Gratuity
Groveland Wells
Hocomonco Pond
Iron Horse Park
Silresim
Wells G&H (Woburn)

MICHIGAN

Allied Paper
Albion - Sheridan
Bruce Products
Cannelton Industries
Duell & Gardiner Landfill
Kentwood Landfill
Ott/Story/Cordova
Tar Lake
Wash King Laundry
Windiate Park

MISSISSIPPI

Newsom Brothers

MONTANA

Anaconda Company Smelter
East Helena Smelter
Milltown Reservoir
Montana Pole & Treating
Silver Bow Creek

NEW JERSEY

Ciba-Geigy
Diamond Alkali/Lister Avenue

E.I. DuPont

Edgeboro Landfill

Global Landfill

Jones Industrial Services

Lipari Landfill

Roebing Steel

Vineland Chemical

NEW YORK

Kingsley Park/Diarsenol Company

Pfohl Brothers

NEZ PERCE

Nez Perce (Idaho)

OKLAHOMA

Compass Industries/Avery Drive

Double Eagle Refinery

Fourth Street Abandoned Refinery

Hardage/Criner

Mosley Landfill

Oklahoma Refining Company

Sand Springs Petro-
Chemical Company

Tar Creek

PENNSYLVANIA

Footo Mineral Site

NGK Metals

PRAIRIE ISLAND

Prairie Island (MN)

ST. REGIS MOHAWK

General Motors-Massena (NY)

SENECA NATION

Peter Cooper (NY)

TENNESSEE

North Hollywood Dump

Tennessee Products aka Chattanooga
Creek

TEXAS

ALCOA (Point Comfort)/Levaca Bay

Brio site

Corpus Christi Neighborhoods

East Austin Terminals

French Limited

RSR aka West Dallas Lead Slag

Sikes Disposal Pits

WASHINGTON

Everett Smelter

Wyckoff/Eagle Harbor

WISCONSIN

Better Brite Plating

Boundary Road

Burlington Northern Train
Derail (MN/WI)

City Disposal Sanitary Landfill

Eau Claire Well

Fadrowski Drum

Hagen Farm

Hunts Disposal

Junkers Landfill

Kenosha Iron & Metal

Kohler Company Landfill

Lemberger Landfill

Lemberger Transport
and Recycling Inc.

Master Disposal Serv. Landfill

Mauthe N.W. Co. Inc.

Muskego Sanitary Landfill
National Presto Industries
Northern Engraving
Oconomowoc Electroplating
Omega Hills
Onalaska Muni Landfill
Penta Wood
Refuse Hideaway Landfill
Ripon FF/NN Landfill
Sanitary Transfer Landfill
Sauk Co. Landfill
Schneider Iron & Metal
Sheboygan Harbor and River
Spickler Landfill
Tomah Fairgrounds
Tomah Municipal Sanitary Landfill
Wausau Groundwater



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Federal Facilities Included on or Proposed for the National Priorities List

State	Site Name	Agency	Final
Alabama	Alabama Army Ammunition Plant	DOD-Army	Y
	Anniston Army Depot	DOD-Army	Y
	Redstone Arsenal	DOD-Army/NASA	Y
Alaska	Adak Naval Station	DOD-Navy	Y
	Eielson Air Force Base	DOD-Air Force	Y
	Elmendorf Air Force Base	DOD-Air Force	Y
	Fort Wainwright	DOD-Army	Y
	Fort Richardson	DOD-Army	Y
	Standard Steel & Metals Salvage Yard	DOT-FRA	Y
Arizona	Luke Air Force Base	DOD-Air Force	Y
	Williams Air Force Base	DOD-Air Force	Y
	Yuma Marine Corps Air Station	DOD-Navy	Y
California	Barstow Marine Corps Logistics Base	DOD-Navy	Y
	Camp Pendleton Marine Corps Base	DOD-Navy	Y
	Castle Air Force Base	DOD-Air Force	Y
	Concord Naval Weapons Station	DOD-Navy	Y
	Edwards Air Force Base	DOD-Air Force	Y
	El Toro Marine Corps Air Station	DOD-Navy	Y
	Fort Ord	DOD-Army	Y
	George Air Force Base	DOD-Air Force	Y
	Jet Propulsion Laboratory	NASA	Y
	Lawrence Livermore Lab	DOE	Y
	Lawrence Livermore Lab Site 300	DOE	Y
	LEHR/Old Campus Landfill	DOE	Y
March Air Force Base	DOD-Air Force	Y	
Mather Air Force Base	DOD-Air Force	Y	

State	Site Name	Agency	Final
California (continued)	McClellan Air Force Base	DOD-Air Force	Y
	Moffett Naval Air Station	DOD-Navy	Y
	Norton Air Force Base	DOD-Air Force	Y
	Riverbank Army Ammunition Plant	DOD-Army	Y
	Sacramento Army Depot	DOD-Army	Y
	Sharpe Army Depot	DOD-DLA	Y
	Tracy Defense Depot	DOD-DLA	Y
	Travis Air Force Base	DOD-Air Force	Y
	Treasure Island Naval Station-Hunters Point	DOD-Navy	Y
	Colorado	Air Force Plant PJKS	DOD-Air Force
Rocky Mountain Arsenal		DOD-Army	Y
Rocky Flats Plant		DOE	Y
Connecticut	New London Submarine Base	DOD-Navy	Y
Delaware	Dover Air Force Base	DOD-Air Force	Y
Florida	Cecil Field Naval Air Station	DOD-Navy	Y
	Homestead Air Force Base	DOD-Air Force	Y
	Jacksonville Naval Air Station	DOD-Navy	Y
	Pensacola Naval Air Station	DOD-Navy	Y
	Whiting Field Naval Air Station	DOD-Navy	Y
Georgia	Marine Corps Logistics Base	DOD-Navy	Y
	Robins Air Force Base	DOD-Air Force	Y
Hawaii	Schofield Barracks	DOD-Army	Y
	Pearl Harbor Naval Complex	DOD-Navy	Y
	Naval Computer & Telecommunications Area	DOD-Navy	Y
Idaho	Idaho National Engineering Lab	DOE	Y
	Mountain Home Air Force Base	DOD-Air Force	Y

State	Site Name	Agency	Final
Illinois	Joliet Army Ammunition Plant Manufacturing	DOD-Army	Y
	Joliet Army Ammunition Plant LAP	DOD-Army	Y
	Sangamo El Dump/ Crab Orchard	DOI	Y
	Savanna Army Depot	DOD-Army	Y
Iowa	Iowa Army Ammunition Plant	DOD-Army	Y
Kansas	Fort Riley	DOD-Army	Y
Kentucky	Paducah Gaseous Diffusion Plant	DOE	Y
Louisiana	Louisiana Army Ammunition Plant	DOD-Army	Y
Maine	Brunswick Naval Air Station	DOD-Navy	Y
	Loring Air Force Base	DOD-Air Force	Y
	Portsmouth Naval Shipyard	DOD-Navy	Y
Maryland	Aberdeen Proving Ground/ Edgewood	DOD-Army	Y
	Aberdeen Proving Ground/ Michaelsville	DOD-Army	Y
	Beltsville Agricultural Research	DOA	Y
	Patuxent River Naval Air Station	DOD-Navy	Y
	Indian Head Naval Surface War Center	DOD-Navy	Y
Massachusetts	Fort Devens-Sudbury Training Complex	DOD-Army	Y
	Fort Devens	DOD-Army	Y
	Hanscom Air Force Base	DOD-Air Force	Y
	Materials Technology Laboratory	DOD-Army	Y
	Natick Laboratory Army Research	DOD-Army	Y

State	Site Name	Agency	Final
Massachusetts (continued)	Naval Weapons Industrial Reserve Plant	DOD-Navy	Y
	Otis Air National Guard/ Camp Edwards	DOD-Air Force	Y
	South Weymouth Naval Air Station	DOD-Navy	Y
Michigan	Wurtsmith Air Force Base	DOE	Y
Minnesota	Naval Industrial Reserve Ordnance Plant	DOD-Navy	Y
	Twin Cities Air Force Reserve Base	DOD-Air Force	Y
	New Brighton/Arden Hills	DOD-Army	Y
Missouri	Lake City Army Ammunition Plant	DOD-Army	Y
	Weldon Springs Quarry/ Plant/Pits	DOE/DOD-Army	Y
	Weldon Springs Ordnance Works	DOD-Army	Y
Nebraska	Cornhusker Army Ammunition Plant	DOD-Army	Y
New Hampshire	Pease Air Force Base	DOD-Air Force	Y
New Jersey	FAA Technical Center	DOT-FAA	Y
	Fort Dix Landfill	DOD-Army	Y
	Naval Air Engineering Center	DOD-Navy	Y
	Naval Weapons Station (Earle)	DOD-Navy	Y
	Picatinny Arsenal	DOD-Army	Y
	W.R. Grace/Wayne Int'l Storage	DOE	Y
New Mexico	Cal West Metals	SBA	Y
	Lee Acres Landfill	DOI	Y
New York	Brookhaven National Lab	DOE	Y
	Griffiss Air Force Base	DOD-Air Force	Y
	Plattsburgh Air Force Base	DOD-Air Force	Y
	Seneca Army Depot	DOD-Army	Y

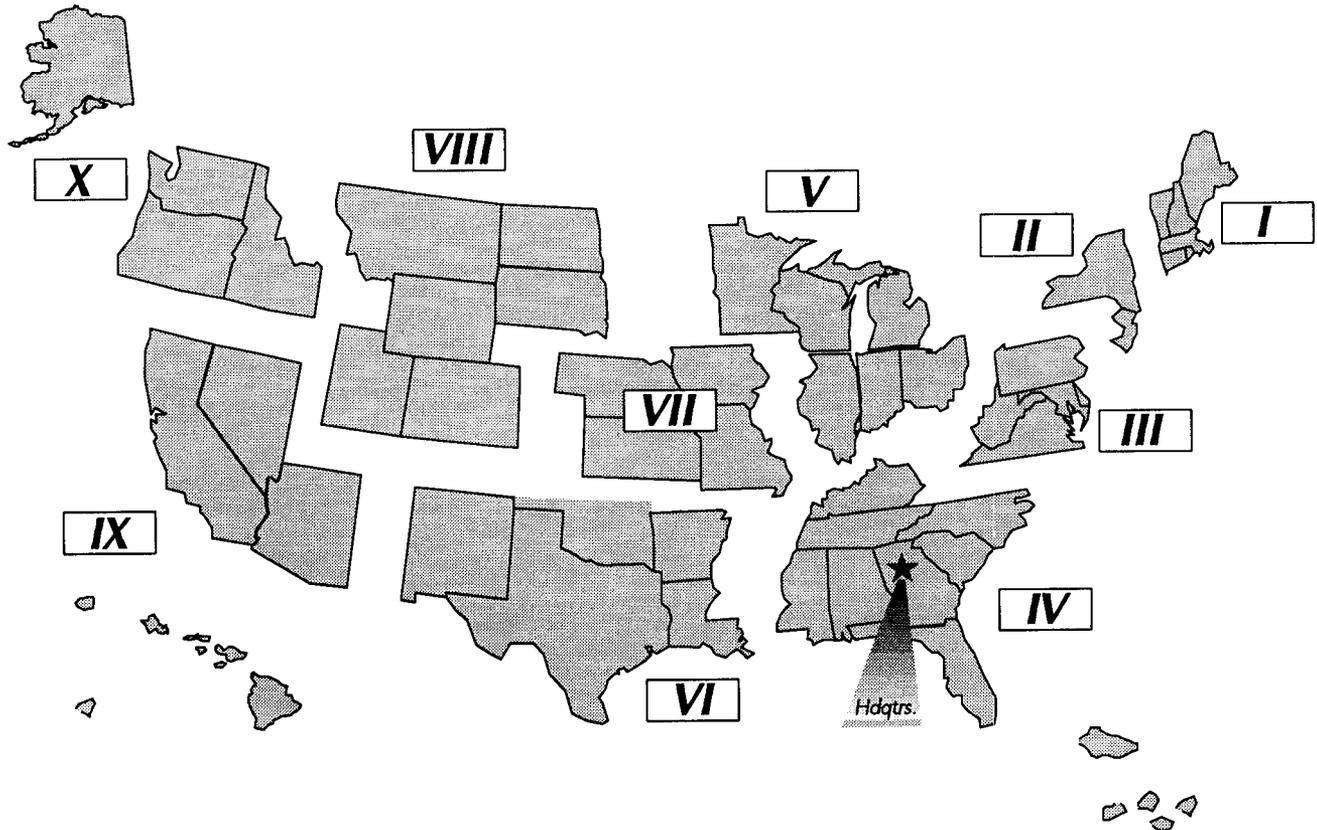
State	Site Name	Agency	Final
North Carolina	Camp Lejeune Military Reservation	DOD-Navy	Y
	Cherry Point Marine Corps Air Station	DOD-Navy	Y
Ohio	Feed Materials Products Center	DOE	Y
	Mound Plant	DOE	Y
	Wright-Patterson Air Force Base	DOD-Air Force	Y
	Air Force Plant #85	DOD-Air Force	Y
	Rickenbacker Air National Guard Base	DOD-Air Force	Y
Oklahoma	Tinker Air Force Base	DOD-Air Force	Y
Oregon	Fremont National Forest Uranium Mines	DOA	Y
	Umatilla Army Depot	DOD-Army	Y
Pennsylvania	Letterkenny SE Area	DOD-Army	Y
	Letterkenny-PDO	DOD-Army	Y
	Naval Air Development Ctr.	DOD-Navy	Y
	Tobyhanna Army Depot	DOD-Army	Y
	Navy Ships Parts Control Ctr.	DOD-Navy	Y
	Willow Grove Naval Air & Air Res. Stn.	DOD-Navy	Y
Puerto Rico	Naval Security Group	DOD-Navy	Y
Rhode Island	Davisville Naval Construction Battalion Ctr.	DOD-Navy	Y
	Newport Naval Education & Training Center	DOD-Navy	Y
South Carolina	Savannah River Site	DOE	Y
	Parris Island Marine Corps Recruit Depot	DOD-Navy	Y
South Dakota	Ellsworth Air Force Base	DOD-Air Force	Y

State	Site Name	Agency	Final
Tennessee	Defense Depot-Memphis	DOD-DLA	Y
	Milan Army Ammunition Plant	DOD-Army	Y
	Oak Ridge Reservation	DOE	Y
	Arnold Engineering Develop. Ctr.	DOD-Air Force	Y
Texas	Air Force Plant #4 (General Dynamics)	DOD-Air Force	Y
	Lone Star Army Ammunition Plant	DOD-Army	Y
	Longhorn Army Ammunition Plant	DOD-Army	Y
	Pantex Plant	DOE	Y
Utah	Hill Air Force Base	DOD-Air Force	Y
	Monticello Mill Tailings	DOE	Y
	Ogden Defense Depot	DOD-DLA	Y
	Tooele Army Depot	DOD-Army	Y
Virginia	Dahlgren Naval Surface Warfare	DOD-Navy	Y
	Defense General Supply Center	DOD-DLA	Y
	Langley Air Force Base	DOD-Air Force/NASA	Y
	Marine Corps Combat Dev. Command	DOD-Navy	Y
	Yorktown Naval Weapons Station	DOD-Navy	Y
	Fort Eustis	DOD-Army	Y
Washington	American Lake Gardens/McChord	DOD-Air Force	Y
	Bangor Naval Submarine Base	DOD-Navy	Y
	Bangor Ordnance Disposal	DOD-Navy	Y
	Bonneville Power Admin Ross Complex	DOE	Y
	Fairchild Air Force Base	DOD-Air Force	Y
	Fort Lewis Logistics Center	DOD-Army	Y
	Hanford 300	DOE	Y
	Hanford 1100	DOE	Y

State	Site Name	Agency	Final	
Washington <i>(continued)</i>	Hanford 100	DOE	Y	
	Hanford 200	DOE	Y	
	Jackson Park Housing Complex	DOD-Navy	Y	
	McChord Air Force Base	DOD-Air Force	Y	
	Naval Undersea Warfare	DOD-Navy	Y	
	Naval Air Station	DOD-Navy	Y	
	Whidbey Island-Seaplane Base Naval Air Station	DOD-Navy	Y	
	Whidbey Island-Ault Field			
	Old Navy Dump/ Manchester Lab	EPA-NOAA	Y	
	Port Hadlock Detachment	DOD-Navy	Y	
	Puget Sound Naval Shipyard	DOD-Navy	Y	
	West Virginia	Allegheny Ballistics Laboratory	DOD-Navy	Y
		West Virginia Ordnance	DOD-Army	Y
Wyoming	F.E. Warren Air Force Base	DOD-Air Force	Y	
Guam	Andersen Air Force Base	DOD-Air Force	Y	



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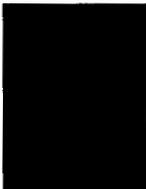
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Index

- 1,1,1-Trichloroethane 4, 24
1,2-Dichloroethene 24
1,4-Dioxane 32
2,4,6-Trinitrotoluene 25
38 Priority Hazardous Substances 27
6th Annual Hazardous Materials Emergency Response Workshop 63
- A Primer on Health Risk Communication Principles and Practices* 64
- Abington Department of Environmental Quality (VA) 8
- ACLPPP 71
- Adult environmental neurobehavioral test battery (AENTB) 44, 52
- Adverse health conditions 44
- Adverse health effects 9, 26, 28, 31, 37, 44, 49, 51, 56, 57, 74
- Agriculture Street Landfill (LA) 9
- Air 1, 3, 16-18, 34, 35, 41, 42, 44-47, 55, 60
- Air Force 44
- Ajo (AZ) 39
- Alabama 13, 57
Flomaton 35
Groewood Community 13
West Montgomery 13
- Alabama Department of Environmental Management 13
- Alameda County Health Department (CA) 71
- Alameda County Lead Poisoning Prevention Program (ACLPPP) 71
- ALCOA/Lavaca Bay (TX) 55
- Alcohols 4
- Aldrin 27
- Allegheny Indian Reservation (PA) 17
- Aluminum Company of America (TX) 55
- American Academy of Family Physicians 62
- American Association of Occupational Health Nurses 62
- American Board of Industrial Hygiene 62
- American College of Emergency Physicians 62
- American College of Occupational and Environmental Medicine 61
- American Osteopathic Association 62
- Aniline 25
- AOEC 60, 61
- APEX-EH 68
- APEX-PH 68
- Applied research 27-29
- ARC/INFO Geographic Information System 82
- Arizona 39, 46, 54
Ajo 39
Clifton/Morenci 39
Douglas 39
San Manuel 39
Tucson 40
Tucson International Airport Site 40
- Arizona Lung Cancer Study 39
- Arkansas 60
University of Arkansas for Medical Sciences 60
- Arkansas Children's Hospital Research Institute 60
- Arkansas Department of Pollution Control and Ecology 18
- Armenia 61
- Army 43
- Aromatic amines 4
- Arsenic 1, 4, 9, 16, 20, 27, 35, 60, 64

- Asbestos 16, 24, 40
- Assessment Information Manager 68
- Assessment Protocol for Excellence in Environmental Health (APEX-EH) 68
- Assessment Protocol for Excellence in Public Health (APEX-PH) 68
- Association of Occupational and Environmental Clinics (AOEC) 60, 61
- Association of Schools of Public Health 69
- Association of State and Territorial Health Officials (ASTHO) 57
- Association of Teachers of Preventive Medicine 61
- Asthma 47, 48
- ASTHO 57
- Atmospheric diffusion modeling 39
- ATSDR Washington Office 75
- Automotive gasoline 25

- Baltimore (MD) 65
- Baton Rouge (LA) 69
- Benchmark dose 26
- Benzene 1, 4, 24, 27, 47, 48
- Benzene Subregistry 47, 48
- Benzene Subregistry Baseline Technical Report* 48
- Benzidine 24
- Benzidines 4
- Benzo(a)pyrene 4
- Beryllium 27, 60
- Big River (MO) 79
- Biologic sampling 16, 19
- Biological indicators of exposure studies 44
- Biological indicators of exposure study 45
- Biomarker workshops 51
- Biomarkers 51, 52, 73
- Biomedical testing 1, 6, 42, 44
- Biota 73
- Birth defects 11, 37, 38, 51, 72
- Birth defects and reproductive disorders 37, 38
- Bloomington PCB Project 70
- Board of Scientific Counselors 73
- Boise (ID) 61
- Bossier City (LA) 8
- Boston (MA) 69
- Boston University 69
- Brominated compounds 17
- Bunker Hill (ID) 45, 46
- Bureau of the Census 41
- Cadmium 4, 27
- Calhoun County (TX) 55
- California 32, 44, 54, 63, 70
 - McClellan Air Force Base 44
 - Oakland 70-71
- Canada 60
- Cancer 11, 13, 17, 26, 37-40, 51, 52
- Carbon disulfide 24
- Carbon tetrachloride 27, 54
- Carcinogen 54
- Carcinogens 64
- Case Studies in Environmental Medicine* 53, 59, 61, 62
- Case Studies in Environmental Medicine: Taking an Exposure History* 62
- CDC 16, 25, 34, 49, 51, 52, 62, 64, 65, 68, 74
- CD-ROM 25, 46
- Cecil County Health Department (MD) 58
- Centers for Disease Control and Prevention (CDC) 16, 25, 34, 49, 50, 52, 62, 64, 65, 68, 74
- CERCLA 5, 7, 8, 12, 23, 24, 26, 27, 50, 53, 63, 67
- CEUs 62
- Chemical mixtures 31
- Cherokee Nation Environmental Health Services 21
- Chlordane 1, 27
- Chlordecone 24
- Chlorfenvinphos 24

- Chlorine 47
- Chloroethane 27
- Chloroform 24, 27
- Chloropyrifos 24
- Chromium 4, 27
- Chronic lymphocytic leukemia (CLL) 51
- Citizen League Opposed to Unwanted Toxins (CLOUT) 10
- Citizens Advisory Committee on Public Health Service Activities and Research at Department of Energy Sites 75
- CLL 51
- CLOUT 10
- CME 56, 62, 70
- Coast Guard 34, 35
- Colorado 54, 59
- Committee on Appropriations 77
- Committee on Commerce 77
- Committee on Environment and Public Works 77
- Committee on Transportation and Infrastructure 77
- Commodity Credit Corporation 54
- Community Assistance Panels 10
- Community education 11, 73
- Community health concerns 7, 10, 40, 56, 57
- Community health education 53, 54, 58
- Community health investigation 6, 70
- Community involvement 8, 10, 11, 13, 58, 67, 69, 70
- Community Involvement Program 67, 69
- Community outreach 8, 10
- Compact disk read-only memory (CD-ROM) 25, 46
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 5, 7, 8, 12, 23, 24, 26, 27, 50, 53, 63, 67
- Computational toxicology laboratory 26
- Conditional logistic regression analysis 40
- Connecticut 54, 57, 71
- Farmington Valley Health District 58
- Connecticut Department of Environmental Health 71
- Consultations 1, 6, 7, 12, 14-19, 32, 33, 70, 71
- Continuing education units (CEUs) 62
- Continuing medical education (CME) 56, 62, 70
- Cooperative agreement 1, 12-16, 29, 55, 57, 58, 60, 62, 69
- Cooperative agreement program 12
- Cooperative agreement states 1, 12, 15
- Cooperative agreements 2, 12, 54, 59
- Cooperative Research and Development Agreement (CRADA) 25
- Copper 4, 39, 40
- Copper smelter 39
- CRADA 25
- Creosote 24, 35
- Crossley Farm/Hereford Groundwater Site (PA) 46
- Cyanide 24, 27
- Dallas Department of Health and Human Services (TX) 45
- DDD 27
- DDE 27, 32
- DDT 27, 32, 70
- DDT,DDE,DDD 27
- Del Amo (CA) 70
- Del Amo Task Force 70
- Department of Agriculture (DOA) 16, 54, 74, 75
- Department of Defense (DOD) 23-25, 43, 65, 74, 75

- Department of Energy (DOE) 18, 23-25, 50, 65, 74, 75
- Department of Family and Community Medicine (KS) 54
- Department of Health and Human Services 20, 37, 45, 54
- Department of the Interior 74, 75
- Department of Transportation (DOT) 74
- Department of Veterans Affairs 65
- Dermal 5, 17
- Desloge Pile (MO) 79
- DHAC 1, 12, 69
- DHE 53
- DHS 37
- Di(2-ethylhexyl) phthalate 27
- Diazinon 24
- Dichlorvos 24
- Dieldrin 27
- Diethyl phthalate 25
- Dinitrocresols 24
- Dinitrophenols 24
- Dioxin 30, 48
- Dioxin Subregistry 48
- Dioxins 16
- Disease- and symptom-prevalence study 6, 51
- District of Columbia 1, 57
- Disulfoton 24, 27
- Division of Health Assessment and Consultation (DHAC) 1, 12, 69
- Division of Health Education (DHE) 53
- Division of Health Studies (DHS) 37
- Division of Toxicology (DT) 23
- Di-n-butylphthalate 27
- Di-n-octylphthalate 25
- DOA 16, 54, 74, 75
- DOD 23-25, 43, 65, 74, 75
- DOE 18, 23-25, 50, 65, 74, 75
- DOI 74, 75
- DOT 74
- DT 23
- Eight Northern Indian Pueblos Council (ENIPC) 59
- Ely Shoshone Tribe 59
- Emergency response 33-35, 63, 67
- Emergency Response and Coordination Group, CDC 34
- Emergency Response Section, ATSDR 34
- Endosulfan 27
- Endrin 24, 27
- Endrin aldehyde 24
- End-stage renal disease 40, 41
- ENIPC 59
- Environmental justice 10, 19, 67, 69
- Environmental Justice Taskforce 67
- Environmental Protection Agency (EPA) 2, 7-12, 14-17, 20, 23, 26-28, 32, 33, 35, 45, 61, 63, 65, 67, 69, 71
- EPA 2, 7-12, 14-17, 20, 23, 26-28, 32, 33, 35, 45, 61, 63, 65, 67, 69, 71
- EPA Environmental Justice Initiative 10
- EPA-New England Urban Environmental Initiatives Group 80
- EPA Region III 11
- Epidemiologic studies 29
- Epidemiologic study 51
- ESRD 40, 41
- Ethers 4
- Ethyl parathion 35
- Ethylene glycol 35
- EU 51, 52
- European Union (EU) 51, 52
- Expert Panel Workshop on the Psychological Responses to Hazardous Substances 71
- Exposure-dose reconstruction 19, 20
- Exposure investigations 13, 15, 18-20
- Exposure registries 77

- Exposure registry 46-49
Exposure studies 44
Exposure study 45
- FACA 18
- Fact sheets 10, 13, 14, 25, 54, 59, 62
- Farmington Valley Health District (CT) 58
- Federal Advisory Committee Act (FACA) 18
- Federal facilities 74
- Federal Facilities Information Management System (FFIMS) 82
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 28
- Federal Register* 29, 32, 50
- Fernald (OH) 18, 75
- Fernald Environmental Management Project 18
- FFIMS 82
- FIFRA 28
- Fish 3, 30-32, 55, 56, 64
- Fletcher's Paint and Storage Facility (NH) 20
- Flomaton (AL) 35
- Florida 25, 54
Boca Raton 25
- Follow-up public health action 5
- Food 47
- Ft. Hall Indian Reservation 41
- Fuel oils 25
- FY 1995 Health Study Findings 38
- Garden produce 17
- Gasoline 25, 35, 40
- GE 28
- General Electric (GE) 28
- Geographic Information System (GIS) 19
- Georgia 10, 57, 64
Atlanta 37, 68, 71, 72
Brunswick 64
Emory University 71
J.T. Reddick Middle School 11
Powell Duffryn Terminal 34
South Tifton 10
Tift General Hospital 11
- GIS 19
- Gloucester County (NJ) 38
- Grand Island (NE) 43
- Great Lakes 17, 30-32, 60
- Great Lakes Chemical Corporation 17
- Great Lakes Critical Programs Act 30, 32
- Great Lakes Human Health Effects Research Program 30, 32
- Great Lakes Research Initiative 76
- Groundwater 1, 3, 11, 14-18, 40, 43, 44, 46, 47, 54, 55, 60
- Groveswood Community (AL) 13
- H&K Sales (MI) 15
- Halogenated pesticides 1, 3, 4
- Halogenated Solvents Industry Alliance (HSIA) 28
- Halons 35
- Hanford Health Effects Subcommittee (HHES) 75
- HARP 67
- Hazardous Substances and Public Health* 64
- Hazardous Substances Data Bank (HSDB) 63
- Hazardous Substances Emergency Events Surveillance System 49
- Hazardous Waste Compliance Docket 74
- Hazardous Waste Treatment Council 76
- Hazardous Waste Workers Surveillance 50
- HazDat 23, 64, 67
- HBCUs 29, 63
- Health Activities Recommendation Panel (HARP) 67
- Health advisories 1-5, 14, 15, 19
- Health advisory 14
- Health assessment 1, 2, 5, 7-10, 12, 14, 53, 55, 56, 69

- Health assessments 1-5, 8, 12, 19, 23, 26, 74
- Health Care Financing Administration 41
- Health consultation 10, 12, 15-18, 34, 71
- Health consultations 1, 6, 7, 12, 14-19, 32, 33, 71
- Health education 1, 5, 6, 11, 18, 53-55, 58, 59, 61, 64, 67, 69, 73, 74
- Health outcome data 19
- Health professions education 5
- Health studies 18, 19, 29, 37, 44, 48, 67, 74
- Health study 5, 38, 43, 44
- Healthy People 2000: National Health Promotion and Disease Prevention Objectives* 78
- Healthy People 2000 Project 78
- Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention* 78
- Heavy metal 60
- Heavy metals 11, 16, 40-41, 44
- Heleva Landfill (PA) 14
- Heptachlor 27
- Hereford Groundwater Site (PA) 46
- Hexachlorobutadiene 27
- Hexachloroethane 25
- Hexamethylene diisocyanate 25
- HHES 75
- Historically Black Colleges and Universities (HBCUs) 29, 63
- Hong Kong 76
- Houston (TX) 35, 42
- Howard Nursing Project 69
- Howard University 69
- Howard University Environmental Medicine Rotation 69
- Howard University College of Nursing 69
- HSDB 63
- HSIA 28
- HTML 25, 64, 74
- Hydraulic fluids 25
- Hydrazines 25
- IAG 30, 63
- Idaho 41, 45, 54, 61
- Ft. Hall Reservation 41
- Idaho Department of Health and Welfare (IDHW) 45, 46
- Kellogg 45
- Page 45
- Silver Valley Health Intervention Program 45
- Smelterville 45
- Wardner 45
- IDHW 45, 46
- Illinois 46, 54, 68
- Southern Illinois University at Carbondale 68
- Immune function disorders 37, 40, 51
- Incinerator 42
- India 77
- Indian Health Service 59
- Indiana 46, 70
- Bloomington 70
- Bloomington PCB Project 70
- LaPorte County Health Department 58
- Indicators of exposure 6, 44, 45
- Indonesia 77
- Indoor air 3, 16
- Ingestion 5
- Inhalation 5, 17, 25, 26, 29, 38
- Inorganic compounds 3
- Insecticide 28
- Insecticides 47
- Institute of Occupational Health 33
- Interagency agreement 30, 63
- Interagency agreements 75
- International Congress on Hazardous Waste: Impact on Human and Ecological Health 72
- Internet 25, 64, 74
- Ionizing radiation 25
- Iowa 51, 54
- Italy 33
- Brescia 33
- Institute of Occupational Health 33

- J.T. Reddick Middle School (GA) 11
- Jet fuels 25
- Joint Institute for Energy and Environment 72
- Joplin (MO) 55
- JP-4, JP-7 25
- JP-5, JP-8 25
- Kansas 51, 54
Kansas Academy of Family Practice 54
University of Kansas School of Medicine-Wichita 54
- Kellogg (ID) 45
- Kentucky 44
BF Goodrich/AIRCO Superfund site 44
Calvert City 44
Calvert City Industrial Complex 44
- Keystone Sanitary Landfill (MD, PA) 11
- Kidney 37, 38, 39, 40-41, 47, 48, 51-52
- Kidney dysfunction 37
- K-65 silos 18
- Laborers' Health and Safety Fund of North America (LHSFNA) 50
- Laborers' International Union of North America (LIUNA) 50
- Landfill 8, 9, 11-12, 14, 38
- Landfills 3, 38
- LaPorte County Health Department (IN) 58
- Lavaca Bay (TX) 55, 56
- Lead 1, 4, 9, 11, 16, 20-21, 27, 29, 45-46, 54, 55, 60, 61, 64, 71
- LHSFNA 50
- LIUNA 50
- Liver dysfunction 37
- Livingston County (KY) 44
- LOAEL 26
- Long Beach (CA) 32
- Lorain County (OH) 16, 32
- Lorain County General Health Department (OH) 16
- Louisiana 8, 9, 54, 69
Agriculture Street Landfill 9
Bossier City 8
New Orleans 8, 9
Thompson Hayward Site 8
- Louisiana Office of Public Health 9
- Lowest-observed-adverse-effect level (LOAEL) 26
- Lung 37, 38, 39, 40, 41-42, 51
- Lung and respiratory diseases 37, 41-42, 51
- Lupus 40
- Managing Hazardous Materials Incidents* 63
- Manganese 27
- Marshall County (KY) 44
- Maryland 8, 11, 65
Baltimore 65
Elkton 8
Keystone Sanitary Landfill 11
- Maryland Department of the Environment 11
- Massachusetts 54, 60
- Massachusetts Department of Public Health 60
- MCS 65
- Medical monitoring 50-51, 73
- Medical Management Guidelines for Acute Chemical Exposure (MMGs)* 62-63
- Memoranda of understanding (MOU) 75
- Memorandum of understanding (MOU) 28
- Mercury 1, 4, 16, 26, 27, 32, 33, 35, 55-56, 60, 64
- Methoxychlor 27
- Methyl parathion 16, 32, 35
- Methyl t-butyl ether 24
- Methylene chloride 27, 28
- Methylene-di-aniline 25
- Mexico 77
U.S.-Mexico Border Area Project 77
- MHPF 29
- Michigan 14-15, 32, 46, 54, 59, 62
Belding 15
Benton Harbor 15

- Michigan Department of Public Health 32
- Michigan State Health Department 62
- Mineral-based crankcase oil 25
- Minimal risk levels (MRLs) 25-26
- Mining 54-55
- Minker/Stout/Romaine Creek site (MO) 48
- Minnesota 51, 60
- Minnesota Department of Health 60
- Minority Health Professions Foundation (MHPF) 29, 69
- Minority Health Professions Foundation Research Program 29
- Minority Health Program 63, 67-69
- Mirex/chlordecone 24
- Mississippi 63-64, 67-68, 69, 73
- Natchez 69
- Mississippi Delta Project 63-64, 67-68, 6, 73
- Mississippi River 68
- Mississippi Valley State University 68
- Missouri 41, 48, 54, 79
- Big River 79
- Desloge Pile 79
- Jasper County Superfund Site 54
- Minker/Stout/Romaine Creek site 48
- Quail Run Mobile Home Park 48
- Romaine Creek 48
- Shenandoah Stables 48
- Times Beach 11, 41
- Tri-State Mining District 54
- Missouri Department of Health 41
- Missouri Dioxin Listing 48
- MMGs 62-63
- Montana 80
- Ft. Belknap Indian Reservation 80
- MOU 28, 75
- MRL 26
- MRLs 25-26
- Multiple chemical sensitivity (MCS) 65
- Multiple Chemical Sensitivity Initiative 65
- Multiple Chemical Sensitivity: A Scientific Overview* 65
- NACCHO 57-58, 68, 69
- Naphthalene 4, 24
- NASA 74
- Natchez (MS) 69
- National Aeronautics and Space Administration (NASA) 74
- National Association of County and City Health Officials (NACCHO) 57-58, 68, 69
- National Center for Environmental Health (NCEH) 18, 34
- National Environmental Health Association (NEHA) 57, 58-59
- National Exposure Registry 46-49
- National Exposure Registry Validation and Assessment Studies 48-49
- National Health Interview Survey 48
- National Institute for Occupational Safety and Health (NIOSH) 34, 61, 63, 65
- National Institute of Environmental Health Sciences (NIEHS) 28
- National Library of Medicine (NLM) 63-64
- National Oceanic and Atmospheric Administration (NOAA) 74
- National Priorities List (NPL) 7, 9, 11, 13, 14, 15, 17, 19, 23, 27, 30, 38, 46, 47, 48, 55, 60, 62, 64
- National Toxicology Program (NTP) 27, 30
- National Tribal Environmental Council 59
- Native American 41
- Native Americans 32
- NCEH 18, 34

- Nebraska 43, 51, 54
 Cornhusker Army
 Ammunition Plant 43
 Grand Island 43
 U.S. Department of
 Agriculture CCC
 Grain Bin Sites 54
- NEHA 57, 58-59
- Neurobehavioral 43, 44,
 51, 52
- Neurologic 43, 65
- Neurotoxic disorders
 37, 42, 52
- New Hampshire 20
 Fletcher's Paint and
 Storage Facility 20
 Milford 20
- New Hampshire
 Department of Health
 and Human Services 20
- New Jersey 13-14, 38, 54
 Lipari Landfill 38
 Lipari Voluntary
 Residence Tracking
 System 38
 Gloucester County 38
 Monmouth County
 Health Department 13
 Pitman 38
- New Jersey Department
 of Environmental
 Protection 13
- New Jersey Department
 of Health (NJDOH)
 13, 38
- New Mexico 59
- New York 16, 38-39, 41,
 47, 58, 60, 61
 Little Valley 16
 Mt. Sinai AOEC Clinic 61
- Niagara County Health
 Department 58
 Salamanca 16
 State University of New
 York 60
 Vestal Water Supply 47
- New York State Department
 of Health (NYSDOH)
 16, 38
- New Zealand 76
- Nez Perce Tribe 59
- Niagara County Health
 Department (NY) 58
- Nickel 24, 27
- NIEHS 28
- NIOSH 34, 61, 63, 65
- Nitrosamines 4
- NJDOH 13, 38
- NLM 63-64
- No apparent public
 health hazard 2, 9
- No-observed-adverse-
 effect-level (NOAEL) 26
- No public health hazard
 2, 5, 9
- NOAA 74
- NOAEL 26
- North Carolina 41-42
 University of North
 Carolina 41-42
- NPL 7, 9, 11, 13, 14, 15, 17,
 19, 23, 27, 30, 38, 46, 47,
 48, 55, 60, 62, 64
- NTP 27, 30
- NYSDOH 16, 17, 38
- OAAS 72-74
- Oak Ridge Institute for
 Science and Education 54
- Oakland (CA) 70-71
- OEM-List 60-61
- Office of Federal Programs
 (OFF) 74-75
- Office of Health and
 Safety, CDC 34
- Office of Policy and
 External Affairs (OPEA)
 76-78
- Office of Program
 Operations and
 Management (OPOM)
 81-82
- Office of Regional
 Operations (ORO) 78-80
- Office of Solid Waste and
 Emergency Response
 Environmental Justice
 Taskforce, EPA 67
- Office of the Associate
 Administrator for
 Science (OAAS) 72-74
- OFF 74-75
- Ohio 16, 18, 32
 Elyria 32
 Fernald 18
 Lorain County 16
- Ohio Department of
 Agriculture 16
- Ohio Department of
 Health 16
- Ohio Environmental
 Protection Agency 16

- Oklahoma 20, 34, 54
 - Oklahoma City 34
 - Ottawa County 20
 - Tar Creek Site 20
- OPEA 76-78
- OPOM 81-82
- Oral 25-26
- Oregon 54
- ORO 78-80
- Otto fuel II 25
- Outreach 8, 10, 53, 63

- Page (ID) 45
- PAHO 77
- PAHs 3, 4, 9, 24, 27
- Pan American Health Organization (PAHO) 77
- PBBs 24
- PBPK modeling 28, 30
- PCBs 1, 16, 20, 24, 28, 31, 32, 64, 70
- Pediatric environmental neurobehavioral test battery (PENTB) 52
- Pennsylvania 11, 14, 46, 57
 - Crossley Farm/Hereford Groundwater site 46
 - Heleva Landfill 14
 - Keystone Sanitary Landfill 11
 - North Whitehall Township 14
- Pennsylvania Department of Health 11, 14
- PENTB 52
- Personal monitoring 8, 19, 50

- Pesticides 1, 3, 4, 31, 34, 47
- Petition Screening Committee, ATSDR 5-7
- Petition 5, 7
- Petitions 6
- Petition sites 5, 6
- Petitioned health assessments 2
- Phenols 4
- Phenoxy acids 4
- PHPCG 67-72
- Phthalates 4
- Physiologically based pharmacokinetic (PBPK) modeling 28, 30
- Pitman (NJ) 38
- Point Comfort (TX) 55
- Poison control centers 25
- Polybrominated biphenyls (PBBs) 24
- Polychlorinated biphenyl compounds 27
- Polychlorinated biphenyls (PCBs) 1, 16, 20, 24, 28, 31, 32, 64, 70
- Polycyclic aromatic hydrocarbons (PAHs) 3, 4, 9, 24, 27
- Port Lavaca Chamber of Commerce (TX) 56
- Potential/indeterminate public health hazard 2
- Powell Duffryn Terminal (GA) 34
- Press Park (LA) 9

- Priority data needs 26-27, 30
- Priority health conditions 37, 51, 61
- Priority List of Hazardous Substances 23
- Private drinking water wells 16
- Private sector voluntarism 26, 28-29
- Private wells 3, 12, 17
- Proceedings of the Expert Panel Workshop to Evaluate the Public Health Implications of the Treatment and Disposal of Polychlorinated Biphenyls-Contaminated Waste* 70
- Propylene glycol 25
- Psychological effects of toxic exposure 71
- Public comment 2, 3, 24, 25, 27, 32
- Public comments 70
- Public health action plan 67
- Public health action plans 67
- Public health advisories 1, 2, 3, 4, 5, 14, 19
- Public health advisory 14
- Public health assessment 1, 2, 7, 8, 9, 10 12, 14, 53, 55, 56
- Public Health Assessment Enhancement Initiative 7-10

- Public health assessments 1, 2-5, 8, 12, 19, 23, 26, 74
- Public Health Conference Support Grant Program 59
- Public health hazard 2-5, 9, 17, 55
- Public health investigation 5, 6
- Public health investigations 5, 6
- Public Health Practice Coordination Group (PHPCG) 67-72
- Public Health Service 27, 37
- Public health statement 24, 64
- Public health statements 25, 64
- Public meetings 13, 54
- Puerto Rico 1
- Radiation 5, 25, 40
- Radionuclides 4
- Radon 18, 19
- RCRA 67
- Records of decision 13
- Registries 31, 74
- Registry 6, 38, 46-49, 63
- Registry of Toxic Effects of Chemical Substances, NIOSH 63
- Registry referral 6
- Resource Conservation and Recovery Act (RCRA) 67
- Rheumatoid arthritis 40
- RSR Smelter (TX) 45
- Sacramento (CA) 44, 63
- Saltville (VA) 8
- Saltville Waste Disposal Site (VA) 8
- San Manuel (AZ) 39
- SARA 26, 63
- SAS 82
- Savannah (GA) 34
- Savannah River Health Effects Subcommittee 75
- SBA 74, 75
- Secretary of Defense 23
- Sediment 16, 35, 44, 55
- Selenium 24, 27
- Seneca Nation of Indians 59
- Shellfish 64
- Shoshone 59
- Silica gel 32
- Silver Valley Health Intervention Program (ID) 45
- Site reviews and updates 2, 12
- Site-specific health education plan 53
- Site-specific preventive health education 53
- Small Business Administration (SBA) 74, 75
- Smelting 55
- Smeltonville (ID) 45
- Soil 1, 3, 9, 10, 11, 15, 17, 18, 19, 20, 35, 44, 45-46, 47, 55, 64, 70, 71
- Soil gas 3, 16
- Soils 55, 71
- South Carolina 54, 60
- South Carolina Department of Health and Environmental Control 60
- Southern University (LA) 69
- SSARP 27-29, 30
- SSPHE 53
- St. Croix (U.S. Virgin Islands) 34
- St. Regis Mohawk Tribe 59
- Stoddard solvent 25
- Subcommittee on Commerce, Trade, and Hazardous Materials 77
- Subcommittee on Superfund, Waste Control, and Risk Assessment 77
- Subcommittee on VA, HUD, and Independent Agencies 77
- Subcommittee on Water Resources and the Environment 77
- Substance-Specific Applied Research Program (SSARP) 27-29, 30

- Substance-specific public health education (SSPHE) 53
- Substance-specific research 5
- Sulfur dioxide 35
- Sulfuric acid 35
- Superfund 5, 7, 8, 23, 26, 28, 30, 40, 44, 51, 53, 54, 58, 63, 64, 67, 70, 72
- Superfund Amendments and Reauthorization Act (SARA) 26, 63
- Surface soil 20, 44, 55
- Surface water 1, 15, 17, 35
- Surveillance 31, 45, 46, 49-51, 60, 73, 74
- Tar Creek (OK) 20-21
- TASARC 28
- T-butyl alcohol 33
- TCA 4, 24, 35, 47
- TCA Baseline and Followup 1 Technical Report* 47
- TCA Subregistry 47
- TCE 1, 4, 16, 17, 24, 27, 28, 40, 42, 43, 46, 49, 60
- TCE Subregistry 43, 46, 49
- Technical assistance 14, 33, 54, 57, 60, 70
- Technical assists 15
- Tennessee 54, Meharry Medical College 68
Oak Ridge Institute for Science and Education 54
- Territorial Health Clinic, St. Croix (U.S. Virgin Islands) 34
- Tetrachloroethylene 1, 4, 24, 27, 28, 35
- Tetryl 25
- Texas 35, 42, 45, 48, 54, 55-56, 60
Brio and Dixie Oil Processing Sites 42
Houston 35, 42
RSR Smelter Site 45
San Jacinto River 35
Three Lakes Municipal Utilities District 48
University of Texas 55, 60
University of Texas Medical Center 60
West Dallas 45
- Texas Department of Health 55-56
- Thompson Hayward Site (LA) 8
- Three Lakes Municipal Utilities District (TX) 48
- Times Beach (MO) 48
- Titanium Tetrachloride 25
- Toluene 27, 34
- Total xylenes 24
- Toxaphene 24, 27
- Toxic Release Inventory (TRI) 63
- Toxic Substances Control Act (TSCA) 28
- Toxicological profile 25
- Toxicological profiles 10, 23-27, 29, 33, 64, 74
- Toxicology Information Program 63
- TOXNET 63
- TRI 63
- Triagency Superfund Applied Research Committee (TASARC) 28
- Tribes 53, 57
- Trichloroethane (TCA) 4, 24, 35, 47
- Trichloroethylene (TCE) 1, 4, 16, 24, 27, 28, 40, 42, 43, 46, 49, 60
- Trichloroethylene Subregistry Baseline Report* 42
- Tri-State Mining District Site (MO) 54
- TSCA 28
- Tucson (AZ) 39, 40, 46
- Tucson International Airport 40
- U.S. Department of Agriculture (DOA) 16, 54, 74, 75
- U.S.-Mexico Border Area Project 77
- U.S. Virgin Islands 34
St. Croix 34
- University of Kansas School of Medicine-Wichita 54
- University of North Carolina 41, 42
- Uranium 25

Urgent public health hazard 2, 4, 5, 55
USAMC-COM 43
Verdese Carter Park (CA) 70
Vinyl chloride 24, 27-29, 35
Virginia 8
 Saltville 8
 Saltville Waste Disposal Site 8
Virginia Department of Environmental Quality 8
Virginia State University 8, 9
VOCs 1, 3, 4, 11, 16, 17, 28, 44, 50, 72
Volatile organic compounds (VOCs) 1, 3, 4, 11, 16, 17, 28, 44, 50, 72
Voluntarism 26, 28

Wales 77
Wan Chai 76
Wardner (ID) 45
Washington 54
Washington, DC 75
Water 1, 10, 12, 14-18, 31, 35, 40, 42, 44, 46-48, 64, 72
West Dallas (TX) 45
West Montgomery (AL) 13
White phosphorus 25
Wisconsin 32, 54
World Wide Web 25, 60, 64
Year 2000 Health Objectives 78
Zinc 27, 54

