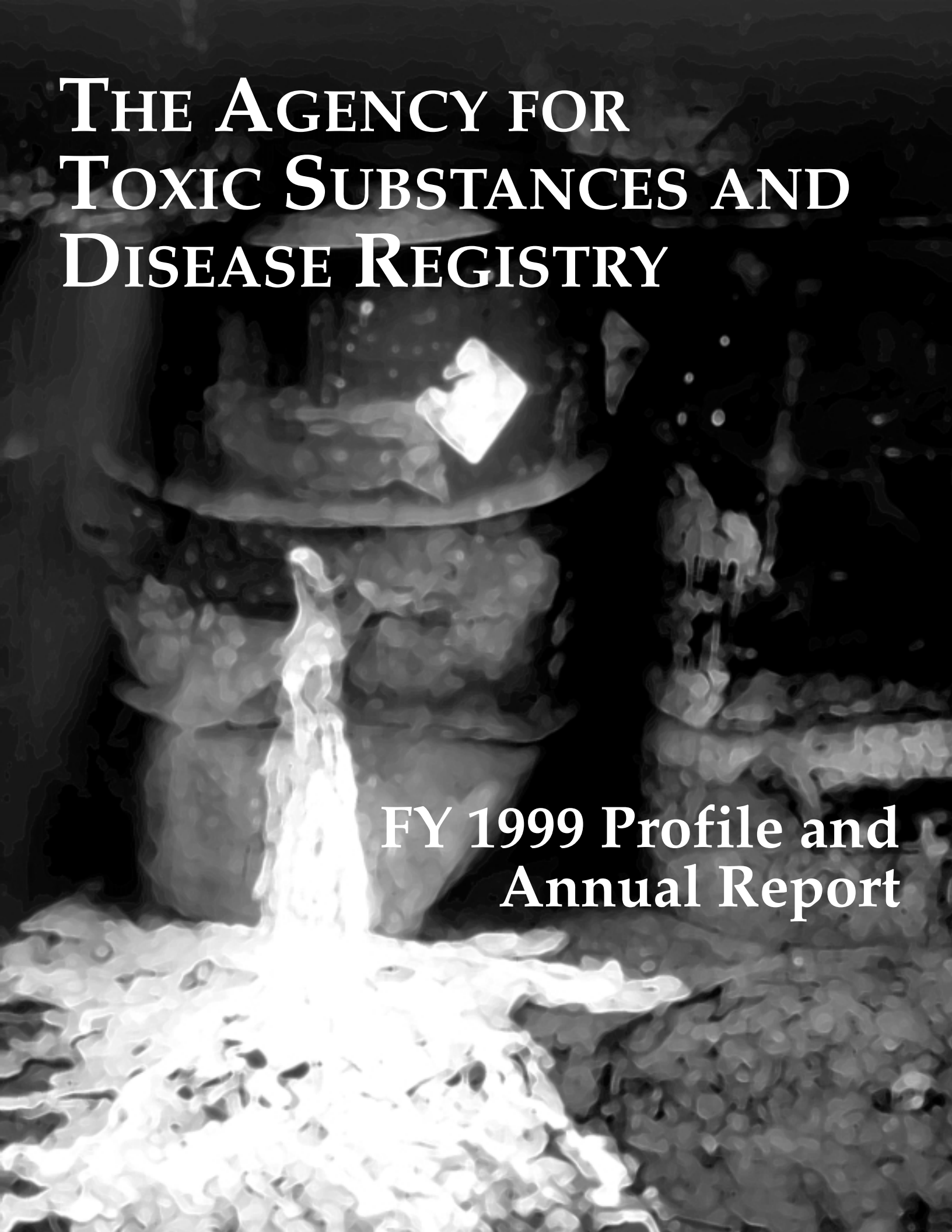
The Agency for Toxic Substances and Disease Registry



FY 1999 Profile and Annual Report

The Agency for Toxic Substances and Disease Registry

FY 1999 Profile and Annual Report

October 1, 1998, to September 30, 1999

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.

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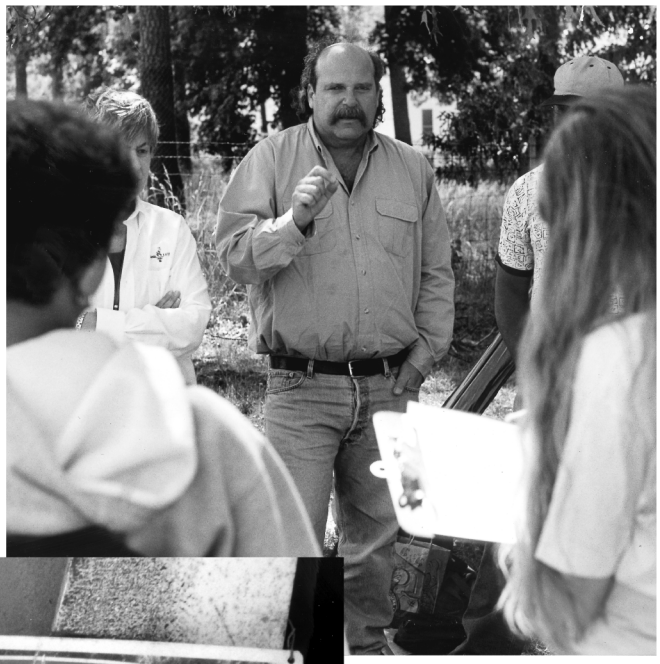
FOREWORD

The Agency for Toxic Substances and Disease Registry (ATSDR) is pleased to present this report of the agency's principal works and findings from fiscal year (FY) 1999. Collectively, ATSDR 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 1999 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 FY 1999 toward improving public health and environmental protection. Comments from interested readers are always welcome.

Jeffrey P. Koplan, MD, MPH
Administrator



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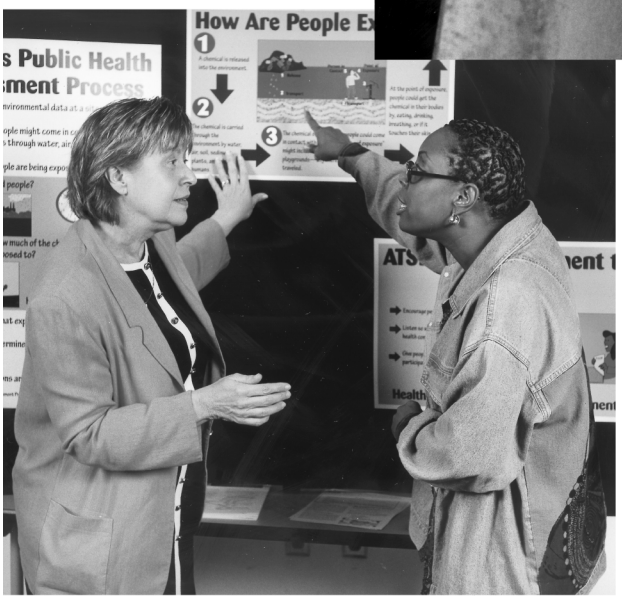
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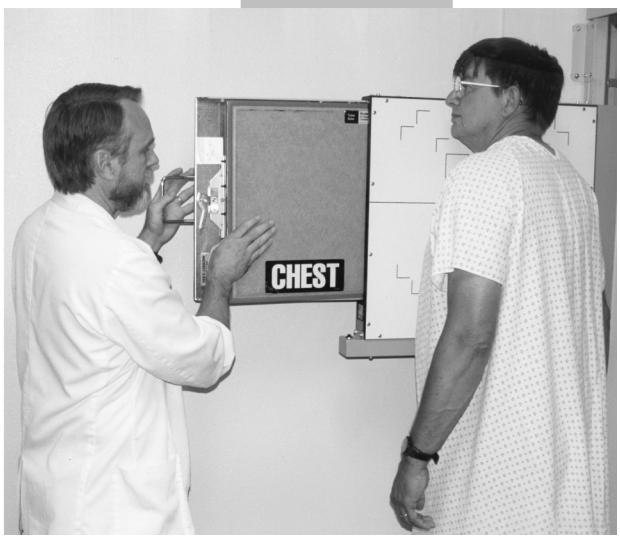
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EXECUTIVE SUMMARY

ATSDR is the lead public health agency responsible for implementing the health-related provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund. ATSDR's primary goals are

- to identify people at health risk because of their exposure to hazardous substances in the environment,
- to evaluate relationships between hazardous substances in the environment and adverse human health outcomes, and
- to intervene to eliminate exposure of health concern and prevent or mitigate adverse health outcomes related to hazardous substances in the environment.

ATSDR accomplishes these goals through its work in four major program areas: (1) health assessment and consultation, (2) toxicological research, (3) health studies, and (4) health education and promotion. This report highlights ATSDR's accomplishments and activities conducted in fiscal year (FY) 1999, with a chapter devoted to each of ATSDR's program areas. These program areas, some key findings, and examples of activities from FY 1999 are summarized below.

CONDUCTING HEALTH ASSESSMENTS AND CONSULTATIONS

During FY 1999, ATSDR's Division of Health Assessment and Consultation and its cooperative agreement states performed more than 1,500 health activities in 49 states, Puerto Rico, and the U.S. Virgin Islands. These activities included issuing 196 public health assessment documents for 151 sites and issuing one public health advisory. The division also conducts health consultations, which provide advice on specific questions about human health hazards associated with hazardous waste sites. The agency provided 408 health consultations in FY 1999.

ATSDR's 607 Cooperative Agreement Program provides funds and technical oversight for participating states to conduct health assessments, consultations, and studies, as well as to provide health education in communities near hazardous waste sites. Staff in participating state health departments use ATSDR guidance for conducting public health assessments, consultations, and studies. Through the partnership, state staff members receive training and experience in assessing the public health impact of hazardous waste sites and have access to ATSDR's scientific resources. In FY 1999, the program provided about $9.5 million to 23 states. ATSDR also provided about $500,000 to five states under a similar program that allows states to conduct health assessments and consultations and health education activities.

Of the sites that ATSDR and states assessed in FY 1999, 106 had completed exposure pathways. ATSDR estimates that about 1.4 million people live within a 1-mile radius of these sites with completed exposure pathways, which are sites at which people might be in contact with hazardous substances. Water and soil were the environmental media most often associated with sites where completed exposure pathways were identified.

Inorganic substances, found at 30% of sites assessed in FY 1999, and volatile organic compounds (VOCs) (26%) were the most common classes of contaminants identified,

followed by polyaromatic hydrocarbons (15%) and halogenated pesticides (13%). The inorganic substances found most often at sites were lead, arsenic, and chromium. The VOCs included benzene, trichloroethylene, and toluene.

Following are two examples of public health activities the Division of Health Assessment and Consultation conducted in FY 1999:

- ATSDR issued a public health advisory in March 1999 for the Hudson Oil Refinery site in Cushing, Oklahoma, because of the site's immediate potential for fire, explosion, and exposure to hazardous substances. The public health advisory assisted the Environmental Protection Agency (EPA) in proposing that the Hudson Oil Refinery Site be placed on the National Priorities List. The advisory also helped EPA obtain necessary funds to continue removal actions without interruption.
- ATSDR's public health assessment of Kelly Air Force Base, Texas, concluded that the community is not currently exposed to levels of contaminants from the base that would cause people to become sick, but that the community may have been exposed to higher levels of contaminants in the past. ATSDR recommended follow-up activities that involve health education and further evaluation of health outcomes.

RESEARCHING AND DISSEMINATING TOXICOLOGIC INFORMATION

ATSDR's Division of Toxicology oversees the agency's toxicologic research, disseminates information about hazardous substances, and responds to emergencies such as spills of hazardous substances. The division directs two major research programs designed to help fill data gaps about the health effects of hazardous substances—the ATSDR Great Lakes Human Health Effects Research Program and the ATSDR Minority Health Professions Foundation Research Program.

The Great Lakes program provides funds for researchers to study the human health consequences of exposure to persistent toxic substances found in the Great Lakes basin. The program supported ongoing research conducted by nine universities or state health departments in FY 1999. The program is adding to the body of research findings about persistent toxic substances, such as dioxin and polychlorinated biphenyls, found in the Great Lakes. One example of a study being conducted through the Great Lakes program follows.

A study being conducted by the State University of New York at Oswego reported that initial test results for 3-year-olds who were exposed to polychlorinated biphenyls (PCBs) prenatally (via their mothers' fish consumption) indicate their scores on tests of memory, verbal, and perceptual performance are lower than those of children whose mothers consumed low amounts of Great Lakes fish or no fish. These deficits among the children exposed to PCBs prenatally were also seen when they were tested as newborns.

The Minority Health Professions Foundation (MHPF) Environmental Health and Toxicology Research Program provides funds for toxicologic research to be conducted at

seven minority health-professions schools. Researchers work on projects designed to fill data gaps about the health effects of hazardous substances. During FY 1999, the research program continued funding for 11 studies that are providing information about the neurotoxic or other health effects of substances such as zinc, manganese, lead, and chlordane.

The Division of Toxicology also disseminates information through its Information Center and provides technical assistance and response through its Emergency Response Section. The Information Center received more than 77,250 requests for technical information assistance and distributed more than 284,210 documents during FY 1999. Most of the requests for information came from private citizens. In FY 1999, ATSDR's toll-free telephone system received approximately 9,650 calls, about 3,000 more calls than in FY 1998. ATSDR's Web site was accessed by more than 500,000 visitors in FY 1999.

In FY 1999, at the request of EPA's regional offices, other federal agencies, and state and local agencies, ATSDR emergency-response personnel responded to requests for information related to 42 acute events (13%), 227 time-critical requests (42%), and 247 non-time critical requests (45%) about hazardous substances. Emergency-response staff provided on-site responses for one acute and two nonacute events. Following is an example of the assistance ATSDR provided to emergency responders.

- ATSDR assisted the Harris County Health Department in Houston, Texas, in its response to a mercury spill at the headquarters of a nonprofit organization that housed a prenatal clinic. Mercury was spilled in the clinic from a damaged blood pressure monitor. ATSDR recommended an indoor action level and additional precautions to prevent exposure of children and pregnant women. In response to ATSDR's recommendations, Harris County temporarily closed the clinic and required cleanup of the mercury contamination.

CONDUCTING HEALTH STUDIES

ATSDR's Division of Health Studies conducts or funds health studies to evaluate the relationship between exposure to hazardous substances and adverse health effects. It also oversees the Hazardous Substances Emergency Events Surveillance System (HSEES). During FY 1999, the division finalized 10 studies that it had conducted or funded. It also issued the 1998 report of the HSEES.

Studies finalized in FY 1999 added to ATSDR's body of knowledge about the relationship between various hazardous substances and seven priority health conditions. These priority health conditions are health outcomes that ATSDR has identified as being associated with exposure to hazardous substances. The seven conditions are birth defects and reproductive disorders, cancer, immune function disorders, kidney dysfunction, liver dysfunction, lung and respiratory diseases, and neurotoxic disorders. Many of ATSDR's health studies look at one or more of these conditions. Of the studies finalized in FY 1999, two dealt with birth defects and reproductive disorders, two with cancer, and two with lung disease and respiratory disease. In addition, two studies included several health outcomes.

Examples of findings from studies finalized in FY 1999 include the following:

- A study ATSDR conducted in California found that racial or ethnic minority infants whose mothers had lived in a census tract with a National Priorities List site were at slightly increased risk for birth defects. The risk was highest for neural tube defects and musculoskeletal defects. Previous ATSDR studies evaluating the relationship between birth defects and living near other hazardous waste sites also found increases in birth defects such as neural tube and musculoskeletal defects.
- The New York State Department of Health conducted a health statistics review to assess cancer statistics in Broome County for 1981 through 1990. The study updated a previous study that focused on 1976–1980. The county's drinking water supplies had been found in the late 1970s to contain VOCs at levels exceeding the state drinking water guidelines. Because of the latency period for cancer, the state conducted the ATSDR-funded follow-up study. The new study found no consistent patterns of excesses or deficits for the 10 different types of cancers studied. However, the area of Broome County with the highest level of trichloroethylene was found to have a significant excess in non-Hodgkin's lymphoma cases, primarily among males.
- The California Department of Health Services conducted a surveillance study to assess whether illnesses were associated with the cleanup of the Ralph Gray Trucking Company National Priorities List site in Orange County. The study found that the group of residents who previously had respiratory problems reported increased wheezing and coughing when the amount of wastes excavated from the sites was highest. Wheezing and coughing were significantly associated with tonnage of waste removed, especially on days when the highest amounts of waste were removed.
- Another FY 1999 study that assessed respiratory health effects also found an increase in respiratory illness in connection with a hazardous waste site, in this case the Fresh Kills Municipal Landfill on Staten Island, New York. The study found that people who had been diagnosed with asthma were more likely to experience respiratory illness when they noticed that odors from the landfill were strongest.

During FY 1999, ATSDR also published the HSEES report for 1998. The report summarized the characteristics of events reported to the 13 states that participated in the program in 1998. These states reported a total of 5,987 events for 1998. Approximately 79% of the events occurred at fixed facilities and 21% were transportation related. In 96% of events, only a single substance was released. VOCs were the most commonly reported categories of substances released. During 1998, 405 events (approximately 7% of all reported events) resulted in a total of 1,533 victims.

ADVANCING HEALTH EDUCATION AND PROMOTION

ATSDR's Division of Health Education and Promotion works to educate individuals, communities, and health-care providers about the health effects of hazardous substances in the environment. In FY 1999, ATSDR and its partners conducted health education and

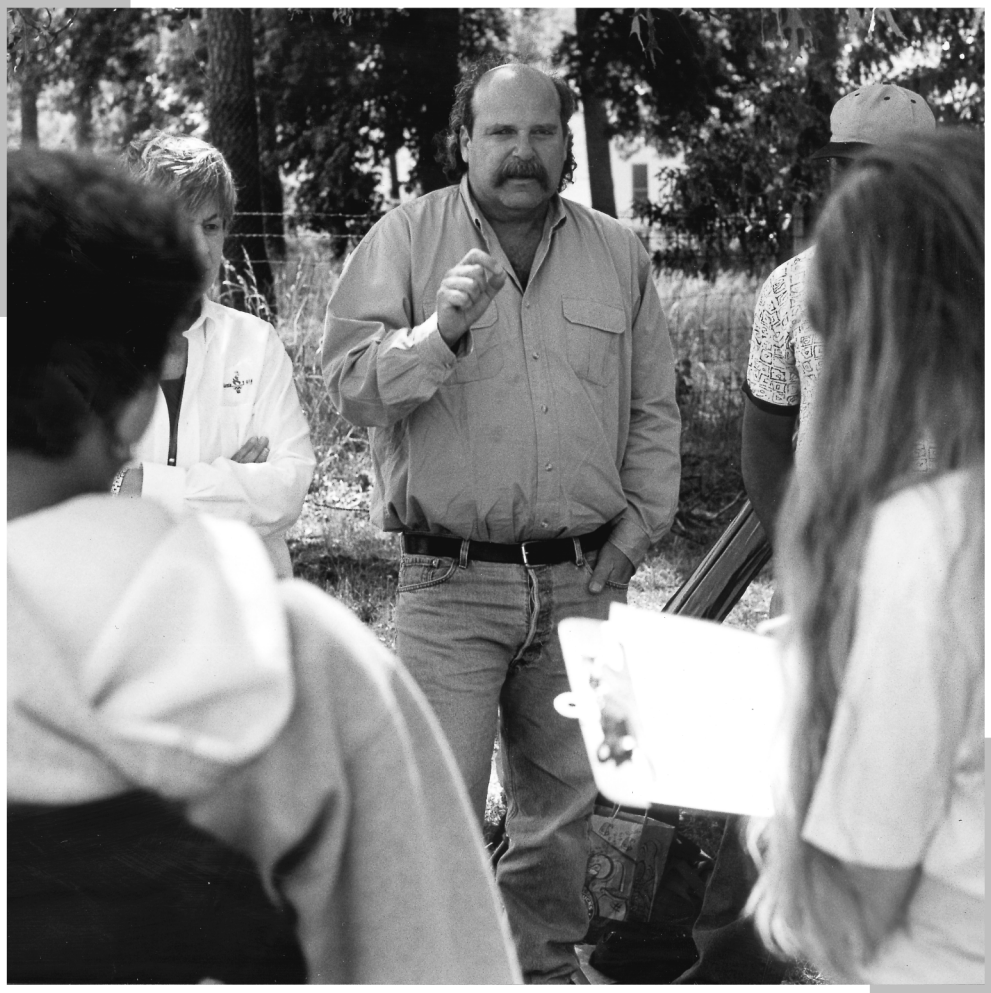
promotion activities at approximately 315 sites. These activities included establishing five pediatric environmental health specialty units at major medical centers across the country, providing environmental medicine training to health care professionals, and developing a variety of educational materials for specific communities.

The states that participate in ATSDR's cooperative agreement programs contribute greatly to ATSDR's health education services and products for people living near hazardous waste sites throughout the United States. Cooperative agreement states, in conjunction with ATSDR, developed fact sheets, brochures, fliers, and training and community education. Grand rounds, conferences, exhibits, public meetings, and school presentations were the venues to provide information to and encourage capacity building in often underserved communities. Following is an example of a cooperative agreement state's efforts to educate the public about health hazards posed by a site in their community.

- The Alabama Department of Public Health, through a cooperative agreement with ATSDR, coordinated community involvement and health education at the Alabama Plating Company site in Vincent, Alabama. The site had been contaminated with lead and other hazards, and there was evidence that children were playing on the site. The health department conducted site visits, mailed information to the community, conducted a community survey, and held public meetings to alert parents to the danger of lead poisoning from this source. As a result, more than 90% of parents surveyed stated that they knew which areas were unsafe and could better make decisions about where children could play.

ATSDR's Division of Health Education and Promotion worked in partnership with five national organizations in FY 1999—the American Association of Occupational Health Nurses (AAOHN), the Association of Occupational and Environmental Clinics (AOEC), the American College of Occupational and Environmental Medicine (ACOEM), the Association of State and Territorial Health Officials (ASTHO), and the National Association of County and City Health Officials (NACCHO). Through these partnerships, ATSDR was able to provide such services as training local health officials, providing medical referrals at sites, and developing case studies on environmental health for health care professionals

ATSDR also works in partnership with other federal agencies to provide health education. For example, through an interagency agreement with EPA, ATSDR initiated a national distribution of the fish consumption guidelines *Should I Eat the Fish I Catch?* in three languages. In FY 1999, approximately 100,000 copies of the guidelines were mailed to active members of the American College of Obstetrics and Gynecology, the American Academy of Pediatrics, and the American Academy of Family Physicians. These guidelines are intended to help physicians identify and counsel the susceptible populations they serve.



AGENCY PROFILE

HISTORY 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, that 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 U.S. Department of Health and Human Services (DHHS) by administrative order established ATSDR as a separate agency of the Public Health Service. In June 1985, ATSDR was formally organized to begin to implement provisions of CERCLA, one of the most challenging and innovative environmental laws relating to public health. ATSDR was to work in concert with the Environmental Protection Agency (EPA), the Centers for Disease Control (CDC, now the Centers for Disease Control and Prevention), and the National Institute of Environmental Health Sciences.

In 1986, when Congress passed the Superfund Amendments and Reauthorization Act (SARA), ATSDR received major new mandates. By August 1989, the agency had assumed its current structure. Since 1989, ATSDR has received additional non-CERCLA statutory responsibilities. The agency, which is headquartered in Atlanta, had a staff of about 410 employees during FY 1999.

ATSDR MISSION

ATSDR's mission 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. 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 public health agency 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 the knowledge base about the health effects of exposure to hazardous substances. CERCLA mandated that ATSDR (1) establish a National Exposure and Disease Registry, (2) create an inventory of health information on hazardous

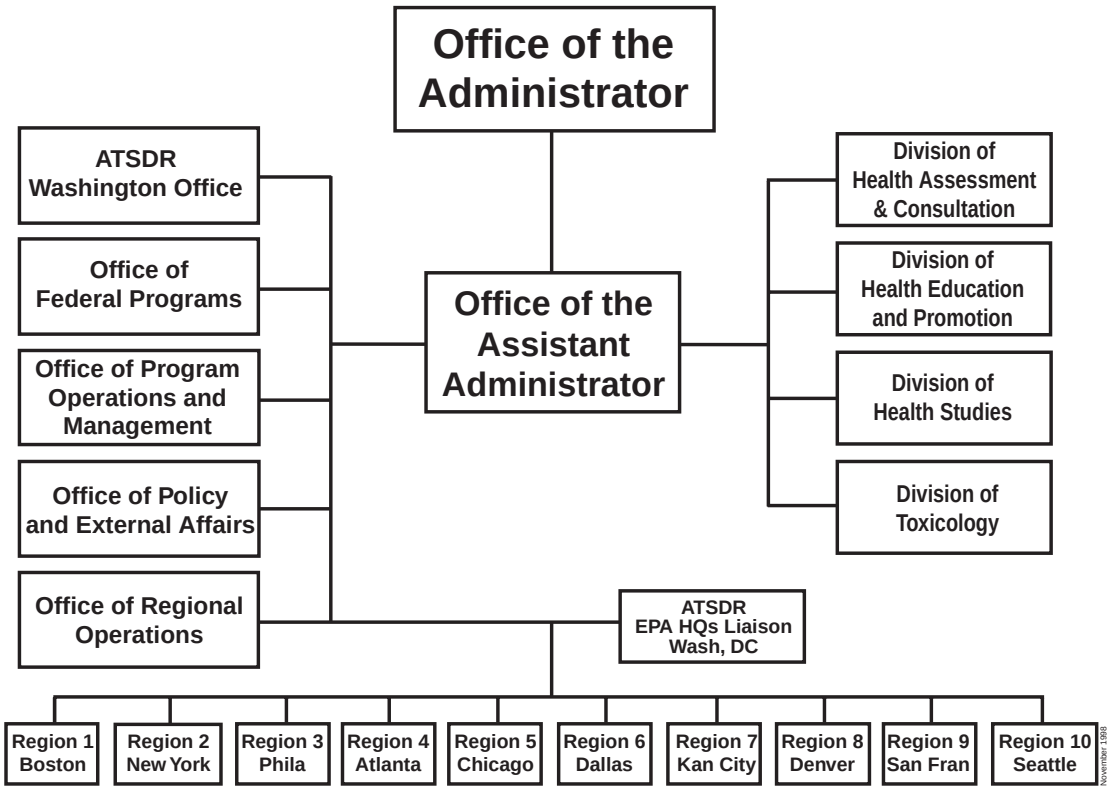
substances, (3) create a list of closed and restricted-access sites, (4) provide medical assistance during hazardous substance emergencies, and (5) determine the relationship between hazardous substance exposure and illness.

The Resource Conservation and Recovery Act (RCRA), as amended in 1984, mandated that ATSDR work with 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.

SARA broadened ATSDR's responsibilities, giving ATSDR mandates to conduct public health assessments, establish and maintain toxicologic databases, disseminate information, and provide medical education in the areas of public health assessments, establishment and maintenance of toxicologic databases, information dissemination, and medical education. 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.

ATSDR ORGANIZATIONAL STRUCTURE

ATSDR executes its operations through four program-specific divisions—the Division of Health Assessment and Consultation, the Division of Toxicology, the Division of Health Studies, and the Division of Health Education and Promotion.



Division of Health Assessment and Consultation

The responsibilities of the Division of Health Assessment and Consultation include the following activities:

- Completing public health assessments for all sites on EPA's National Priorities List (NPL) within 1 year of the date each site is proposed to be added to the NPL;
- Responding to petitions for public health assessments;
- Providing consultation on health issues related to exposure to hazardous or toxic substances, including consultations requested by EPA, state, or local officials; and
- Determining the extent of danger to public health from a release or threatened release of a hazardous substance.

Division of Toxicology

The responsibilities of the Division of Toxicology include the following activities:

- Reexamining the CERCLA Priority List of Hazardous Substances annually and including any additional hazardous substances found to pose a significant potential threat to human health. Updated lists are published biennially.
- Preparing a toxicological profile for each hazardous substance on the CERCLA Priority List of Hazardous Substances. A toxicological profile is a document in which ATSDR scientists interpret all known information about a specific substance and describe the levels at which people might be harmed if exposed. The toxicological profile also identifies significant gaps in knowledge about the substance and serves to initiate additional research, if needed.
- Providing emergency response consultations to determine the extent of danger to public health from a release or threatened release of a hazardous substance;
- Conducting a research program in cooperation with the National Toxicology Program to determine the health effects of hazardous substances.

Division of Health Studies

The responsibilities of the Division of Health Studies include the following activities:

- Conducting periodic surveys and screening programs to determine relationships between exposure to toxic substances and illnesses;
- Conducting epidemiologic studies that test scientific hypotheses to evaluate the causal nature of associations between exposure to hazardous substances and disease outcome;

- Conducting health surveillance programs of populations exposed to hazardous substances, including medical testing and referral for treatment; and
- In cooperation with the states, establishing and maintaining national registries of (1) persons exposed to hazardous substances and (2) persons with serious diseases or illness. As specified by the provisions of SARA, 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 and Promotion

The responsibilities of the Division of Health Education and Promotion include the following activities:

- Conducting site-specific programs to assist communities and health professionals in understanding, preventing, or reducing adverse health effects of exposure to hazardous substances. These activities promote awareness, share information, increase knowledge, promote behavioral changes, provide medical consultations, and communicate potential health risks.
- Supporting a wide array of environmental health education and promotion activities for health care providers, public health officials, and communities through cooperative agreement programs with national organizations of health professionals.
- Developing, distributing, and evaluating environmental public health information and training programs in various formats, languages, and media.

Office of the Assistant Administrator

In addition, ATSDR has several offices that provide administrative, scientific, or management support to the agency and its divisions. These offices are contained within the Office of the Assistant Administrator.

The Office of the Associate Administrator for Science serves as the agency focal point for science issues that have an impact on ATSDR programs and activities. The office provides administrative and technical support to the agency's Board of Scientific Counselors and its Community/Tribal Subcommittee, the ATSDR peer review process, and a science forum for sharing scientific information among staff members.

In 1998, ATSDR established an Office of Children's Health to coordinate child health programs throughout the agency; (2) identify in collaboration with other divisions and offices new projects that benefit children; and (3) solicit input from, and disseminate information to, partner agencies and organizations. ATSDR's office complements EPA's formation of the Office of Children's Health Protection and the federal Task Force on Children's Environmental Health and Safety Risks (established under Executive Order No. 13045).

The Office of Federal Programs was established to plan, recommend, manage, and coordinate the policies 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.

The Office of Policy and External Affairs promotes the mission of ATSDR by coordinating the agency's efforts to build public health capacity in state and local entities, providing analysis of agency policy, and communicating information about ATSDR's activities. The office coordinates public affairs activities, provides editorial and graphics services to the agency, and produces various publications, reports, and fact sheets to communicate agency activities.

The Office of Program Operations and Management develops and executes ATSDR's budget, including Superfund and other federal program funds. In addition to managing the ATSDR budget, OPOM provides management support for the agency in the areas of program planning; recruitment and employee development; information access, exchange, and utilization; training; travel; procurement; and other administrative services.

The Office of Regional Operations assists in the implementation of ATSDR activities across the country. ORO has ATSDR regional representatives at each of the 10 EPA Regional Offices and a liaison at EPA headquarters in Washington, DC. This distribution of staff in regional locations promotes communication and interaction with ATSDR's main partners: the public, EPA, and state and local environmental and public health agencies.

The Office of Urban Affairs coordinates the agency's efforts on issues related to environmental justice, minority health, and Brownfields sites.

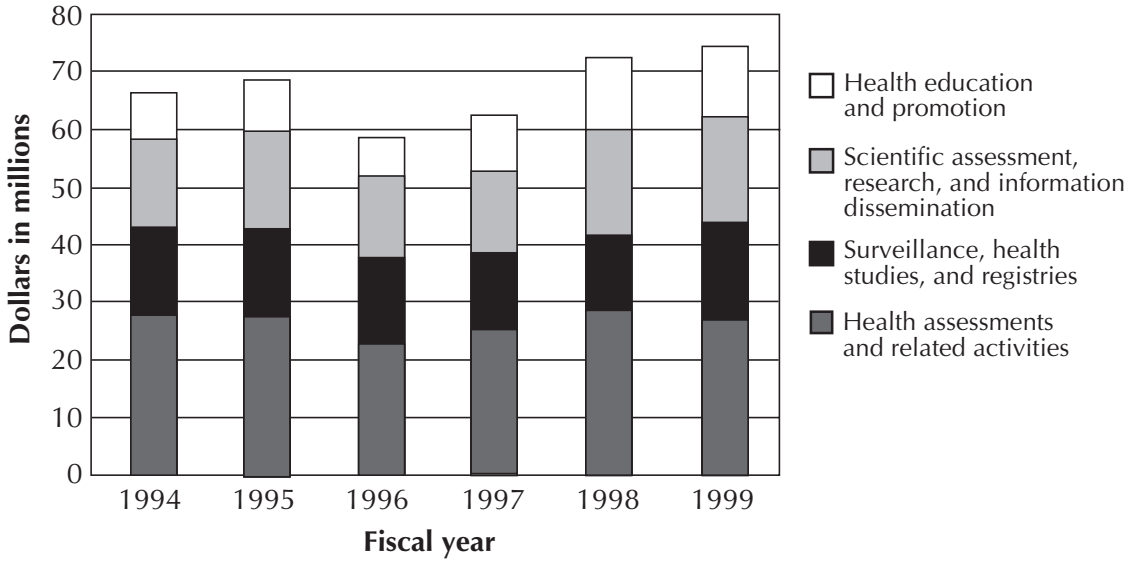
The ATSDR Washington Office links the agency with other executive branch departments and agencies and the legislative branch of government. Through this office, ATSDR is positioned to respond quickly to issues raised in Congress and other federal governmental and nongovernmental organizations that relate to agency programs.

ATSDR BUDGET AND APPROPRIATIONS HISTORY

ATSDR is funded through EPA and its personnel are allocated through the CDC. Funding for ATSDR activities at federal facility sites is negotiated with the U.S. Department of Defense (DOD) and Department of Energy (DOE).

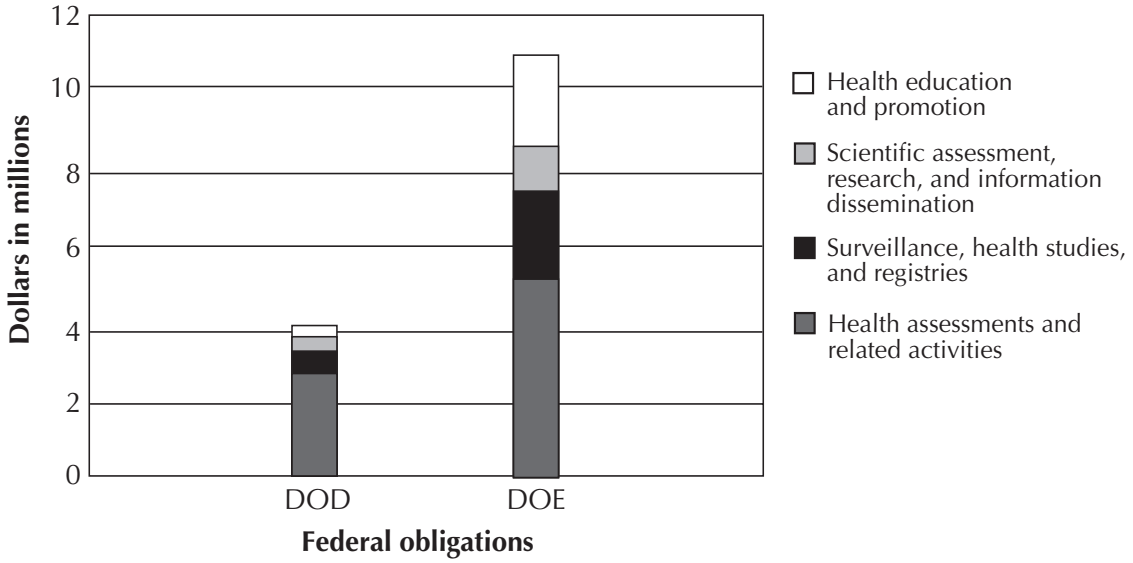
Figure 1 contains a breakdown of ATSDR's Superfund budget obligations, by budget activity, for FY 1994 through FY 1999.

Figure 1. ATSDR CERCLA (Nonfederal obligations), FY 1994 through FY 1999



ATSDR is mandated by Congress to conduct public health assessments, health studies, surveillance activities, and health education at federal NPL waste sites, as well as develop toxicological profiles of high-priority chemicals found at these sites. These tasks are made complex by the absence of a congressional mandate to federal agencies (with the exception of DOD) to provide ATSDR with the necessary staff and budget to conduct these activities. ATSDR negotiates with DOD and DOE to establish annual work plans and budgets required to conduct its programs at DOD and DOE facilities. Figure 2 illustrates ATSDR's FY 1999 DOD and DOE operating budgets, by budget activity.

Figure 2. ATSDR's FY 1999 Operating Budget from DOD and DOE



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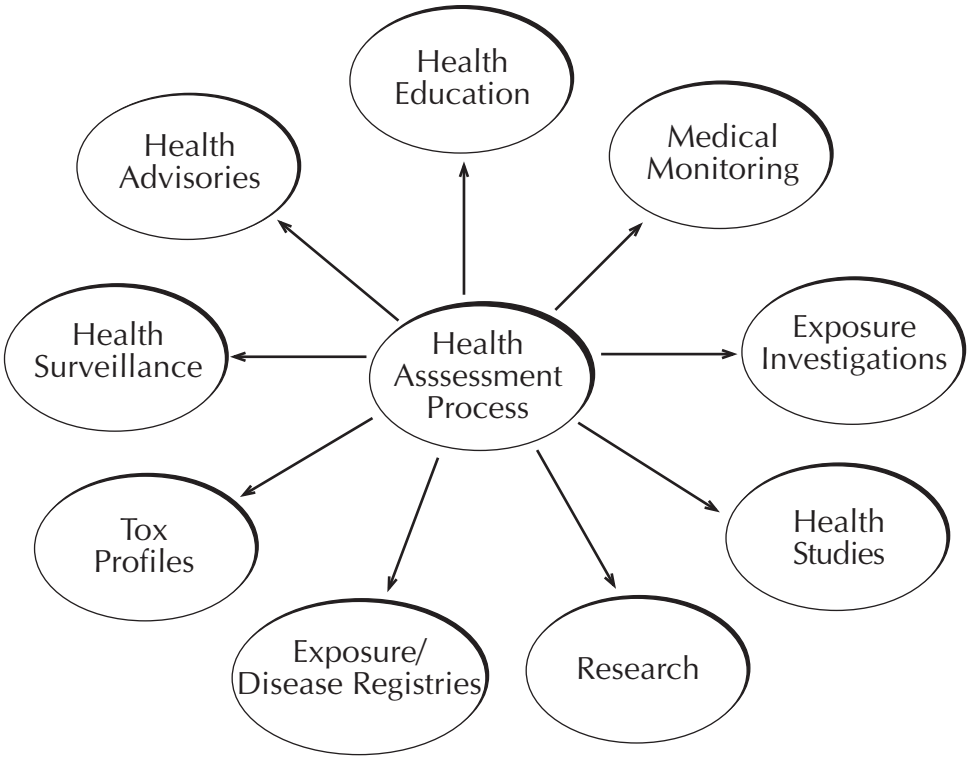
Chapter One: Conducting Health Assessments and Consultations

Introduction

The Division of Health Assessment and Consultation conducts public health assessments and related activities, issues public health advisories, and provides public health consultations. The health assessment process conducted by this division is often the trigger for a variety of other ATSDR activities and public health recommendations that are shown below.



A key component of the public health assessment process is exposure evaluation. For people to possibly suffer adverse effects or disease associated with hazardous substances, they must be first exposed to them. In 1991, the National Research Council recognized that public health assessments could be an important source of information about the nature and extent of environmental exposure to hazardous substances. The National Research Council pointed to the general lack of scientifically based information on how substances move from a source to expose persons living near sites. In response, ATSDR initiated a series of activities intended to better determine the factors that influence how substances reach nearby populations, estimate the extent of

exposure, and better define who is actually likely to be exposed as a result of chemical releases into the environment. After a period of development, ATSDR began to routinely use a variety of methods and approaches as integral components of the public health assessment process. These include

- Geographical information systems,
- Exposure investigations,
- Fate and transport models, and
- Exposure-dose reconstruction.

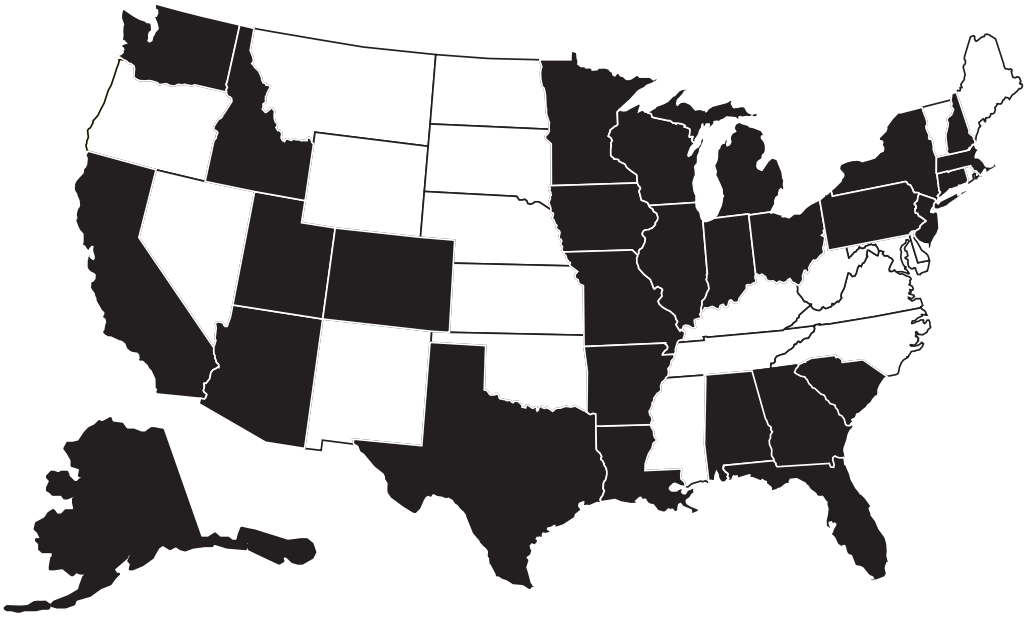
These techniques provide the scientific support for evaluating exposures when conducting public health assessments. This chapter highlights these methods and approaches and gives examples of how they have been used in the public health assessment process. The integration of these techniques helps to provide a clearer spatial and temporal picture (i.e., a series of snapshots of places and time) of the potential for exposures in the past, present, and future.

This chapter also provides an overview of some significant ATSDR program activities and accomplishments. Highlighted are ATSDR's commitments to working more closely with tribal nations and communities and to protecting the health of children living near hazardous waste sites. These programmatic activities, along with the expanding use of better scientific tools and methods, are critical to addressing exposure and ultimately evaluating the impact of hazardous waste sites on the health of communities.

ATSDR'S COOPERATIVE AGREEMENT PROGRAMS

ATSDR's 607 Cooperative Agreement Program provides funds and technical oversight for participating states to conduct health assessments, consultations, and studies, and to provide health education in communities near hazardous waste sites. Staff members in participating state health departments use ATSDR guidance for conducting public health assessments, consultations, and other activities. In FY 1999, ATSDR had cooperative agreements with 23 states under this program. ATSDR also had cooperative agreements in FY 1999 with five other states under a similar program that allows states to conduct health assessments, consultations, and health education activities.

Map of Cooperative Agreement States (shaded areas)



OVERVIEW OF PUBLIC HEALTH ASSESSMENT FINDINGS

During FY 1999, ATSDR and its 28 cooperative agreement states performed more than 1,500 health activities in 49 states, Puerto Rico, and the U.S. Virgin Islands. These activities included 196 public health assessments and a public health advisory for uncontrolled hazardous waste sites.

The agency estimates that more than 1.7 million people live within a 1-mile radius of the sites that were the subjects of the FY 1999 public health assessments and public health advisory. The population living within a 1-mile radius of the 106 sites that had completed exposure pathways numbered about 1.4 million. Water and soil were the environmental media most often associated with sites where completed exposure pathways were identified.

ATSDR made three types of public health assessment recommendations: 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 or continuation of monitoring efforts, additional characterization of environmental media, institutional and physical restrictions on site access, health statistics reviews, and site-specific health education to increase community members' understanding of the public health implications. Although less common, there were also recommendations for biomedical testing, evaluations of exposure indicators, and additions of exposed populations to specific subregistries. Following are details of ATSDR's FY 1999 public health assessment activities.

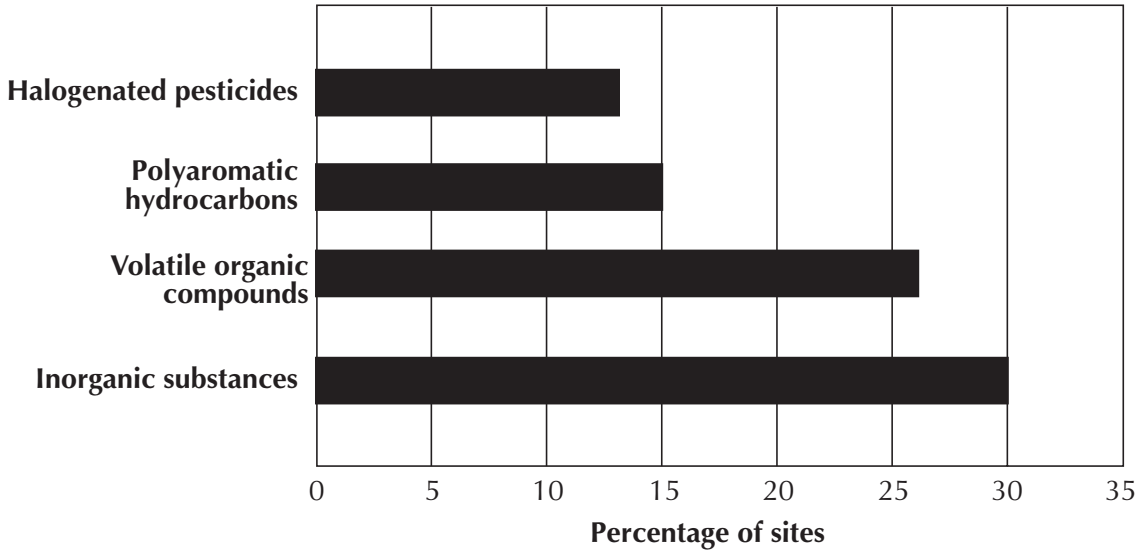
Public Health Assessments

The agency, in collaboration with state health departments under cooperative agreements, prepared 196 public health assessment documents and one public health advisory for 151 sites during FY 1999.

The public health assessments and the advisory completed in FY 1999 classified 22% of the sites investigated as being of public health concern or urgent public health concern. Another 27% of sites were classified as indeterminate or potential health concerns.

Inorganic substances, found at 30% of sites assessed in FY 1999, and VOCs (26%) were the most common classes of contaminants identified, followed by polyaromatic hydrocarbons (15%) and halogenated pesticides (13%) (Figure 1). The inorganic substances found most often at sites were lead, arsenic, and chromium. The VOCs included benzene, trichloroethylene, and toluene. For the most part, contaminants for sites in all health hazard categories with completed exposure pathways were identified in soil (30%), groundwater (municipal and private wells) (26%), and air (17%). The frequency with which the contaminants were identified in those media may reflect the fact that those media were most frequently sampled, rather than that the media were more likely to be contaminated. Data gaps exist for some media.

Figure 1. Major Contaminants Found at Sites Assessed in FY 1999



Public Health Advisory Cushing, Oklahoma

ATSDR issued a public health advisory on March 4, 1999, for the Hudson Oil Refinery site in Cushing, Oklahoma, because of the site's potential for fire, explosion, and exposure to hazardous substances. The issuance of the public health advisory assisted EPA in proposing the Hudson Oil Refinery Site to the NPL. It also helped EPA obtain necessary funds to continue removal actions without interruption.

The site is an inactive refinery that produced aviation fuel, diesel fuel, gasoline, liquid propane gas, coke, and fuel oils for 60 years. The refinery was shut down in 1982, but chemicals remained stored at the site. Highway 33, the main highway in Cushing, runs through the site. An estimated 3,485 of Cushing's 7,218 residents live within a 1-mile radius of the refinery. In September 1998, EPA initiated emergency removal action of loose asbestos at the south refinery and began to investigate other hazards at the site.

The public health advisory supported the work being conducted by EPA, Oklahoma, and Cushing to address public health issues at the site. In the advisory, ATSDR recommended that EPA continue its emergency removal actions and decontamination of the site and that Hudson Oil Refinery be considered for addition to the NPL. ATSDR issued the public health advisory in response to a request from EPA Region VI regarding hazards at the site and emergency removal activities. Some containers of hazardous, flammable chemicals that were stored there were leaking, the advisory noted.

EPA, the city of Cushing, and the Oklahoma Department of Environmental Quality implemented a number of public health actions in response to the public health advisory, including

- removing asbestos-containing material in the south refinery area,
- routinely patrolling the site to prevent trespassing,
- providing site-specific health education, and
- posting warning signs.

In addition, ATSDR recommended stabilizing site conditions by removing other chemical and physical hazards. ATSDR also recommended removing, after EPA emergency actions are completed, asbestos-containing material at the north refinery area while following strict asbestos abatement guidelines.

Health Consultations

Health consultations provide advice and recommendations on specific, health-related questions concerning actual or potential human exposure to hazardous substances or with any other related human health hazards. A health consultation is often quickly needed to permit mitigation or prevention of adverse human health effects from exposure to hazardous substances in the environment.

Consultations vary in complexity; either an individual health professional or a team may respond to a question about a site or issue. In some cases, ATSDR prepares more than one health consultation in response to a request for help with an exposure or potential exposure. Health consultations may be either written or oral, and they are timely; for example, an oral consultation might be provided on the day a request reaches ATSDR.

In FY 1999, ATSDR and the cooperative agreement states prepared 408 health consultations. These health consultations were prepared in response to requests from citizens, state environmental agencies, EPA, and other groups. The health consultations covered a variety of topics, including cleanup of contaminated soils, ingestion of solvent-contaminated well water, inhalation of lead-contaminated dust, and final cleanup actions at a landfill. Following is an example of a health consultation.

Naval Station Newport, Newport, Rhode Island

ATSDR's health consultation at Naval Station Newport, in Newport, Rhode Island, helped reduce the community's concerns by confirming that the contaminant levels found in a playground did not pose a health hazard to children.

EPA requested that ATSDR provide health information about the safety of the playground, which formerly was used as a fire fighter training ground. ATSDR attended a series of public meetings from November 1998 through April 1999 to address the concerns of the community. The parents of children who had played at the playground were trying to decide if they should have their children medically tested.

ATSDR recommended that additional soil samples be collected in specific areas. These data enabled ATSDR to conclude that the playground did not pose a health hazard. The agency informed the community of its findings at meetings and in a health consultation issued in March 1999. ATSDR's finding that the playground did not pose a health hazard resulted in lower remediation costs. Additionally, the information provided to the public helped parents make choices about seeking medical testing for their children.

EXPANDING THE SCIENCE FOUNDATION: IMPROVED METHODS AND APPROACHES TO EVALUATE EXPOSURE

Exposure assessment is the first critical step in establishing a link between the release of hazardous substances and an impact on community health. Public health assessments try to get information that answers the following series of related questions for past, present, and future time frames of exposure:

- Who was exposed?
- How were they exposed?
- What were they exposed to and to how much?
- When were they exposed and for how long?

ATSDR uses geographic information systems, exposure investigations, fate and transport models, and exposure dose reconstruction to answer exposure-related questions. Although the merits and key features of each method and approach are described separately here, they are often used together in a comprehensive integrated approach to assess exposure.

Geographic Information Systems

The use of geographic information systems (GIS) technology has become an integral part of the public health assessment process. GIS is a computer software application that compiles multiple data layers (e.g., environmental, contaminant, outcomes, and demographic) and then relates these layers to one another in a geographic area. It helps answer questions about *who* lives around sites (that is, the demographic data) and *where* they live. Maps can help communities and those involved with assessing hazards associated with the site to better visualize where things are and how people might be exposed. Knowing the demographics of surrounding populations could be critically important, and GIS helps provide initial information to health assessors before they ever visit the site.

GIS is used to put a demographic face on the populations living within 1 mile of the sites on the National Priorities List (NPL) of Superfund sites. Staff members use site boundaries, data from the 1990 U.S. census, and an area proportion technique to identify the number of people living within a mile of these sites. To date, this technique has been used at approximately 1,600 sites. ATSDR estimates that almost 15.5 million people live within a mile of a hazardous waste site. Of those, nearly 4 million (25%) are nonwhite. Hispanics are the largest ethnic group in the site population, with more than 2 million people (14%).

GIS and census data are also used to identify the size of potentially sensitive subpopulations (e.g., the young, the elderly, and women of childbearing age) around the sites. One example is the number of children less than 6 years of age. There are more than 1.5 million (11%) children less than 6 years old in the site populations. ATSDR's Child Health Initiative is concerned with children and teenagers less than 18 years of age. Using GIS, it is estimated that there are almost 3 million (19%) children and teenagers in the site populations. To further enhance our understanding of the site populations, in 1999 ATSDR began to incorporate into its site analyses neighborhood segmentation data from PRIZM, a database containing up-to-date population estimates and socioeconomic information for census block groups. This information gives added depth to the analysis of site populations.

Fate and Transport Models

"Fate and transport" refers to the movement of a hazardous substance from its source through the environment, until it comes into contact with people. Scientists have developed mathematical models that predict the fate and transport of hazardous substances through the environment. These models predict how chemicals travel through the environment, how they break down, and how key physical and chemical properties of chemicals (including water solubility, volatility, and soil adsorption) affect the potential for exposure. One such model is ATSDR's Analytical Contaminant Transport Analysis System (ACTS) software package. ACTS is designed for use as a "screening level" tool that helps health assessors understand basic concepts of fate and transport of contaminants within an environmental system.

Exposure Investigations

Exposure investigations are conducted to gather and analyze site-specific information to determine if human populations have been exposed to hazardous substances. Information is obtained through biomedical testing, environmental testing, and exposure-dose reconstruction. Biomedical testing (e.g., urine or blood samples) can show current (and sometimes past) exposure to a contaminant. Environmental testing (for contamination of soil, water, or air) is focused on where people live, spend leisure time, or might come into contact with contaminants under investigation. Exposure-dose reconstruction analyses use environmental sampling information and computer models to estimate the contaminant levels that people may have been exposed to in the past or may be exposed to in the future. Estimations of the exposure dose are used to evaluate how a person's health might be affected. The results of exposure investigations are used to make public health decisions and to recommend appropriate public health actions.

Exposure-Dose Reconstruction Modeling

Often not enough information is available about a community's past exposures to estimate health risks. Therefore, researchers have to reconstruct levels of hazardous substances that people may have been exposed to and the length of time they were exposed. Exposure-dose reconstruction modeling is used to estimate the patterns of movement and concentrations of contaminants from the source via a variety of environmental media. ATSDR researchers use computational models to test a variety of exposure estimates and make recommendations based on scientifically accepted techniques and procedures.

Below are several examples of public health activities ATSDR conducted in FY 1999 using new technologies.

Toms River, Dover Township, New Jersey, Public Water-Distribution System Model

In the spring of 1995, ATSDR and the New Jersey Department of Health and Senior Services began to investigate health concerns of the Dover Township, New Jersey, community. Community members were concerned about the number of childhood cancer cases and feared that exposure to environmental contaminants from the area's hazardous waste sites, including two National Priorities List (Superfund) sites, were related to the elevated incidence of childhood cancer.

ATSDR is helping state health officials assess whether exposure to contaminants in the drinking water is associated with increased incidence of childhood cancer. Because approximately 85% of the Dover Township area residents obtain their potable water from the water-distribution system, an analysis of the potential for distribution of contaminants through the water-distribution system was needed.

ATSDR initiated an exposure assessment approach for use in an epidemiologic study of childhood leukemia and central nervous system cancers that occurred from 1979 through 1996 in Dover Township. Groundwater contamination has been documented historically in public- and private-supply wells. The water-distribution system has 23 municipal wells distributed at eight points of entry. In 1997, it serviced a population of 92,160. Because the Dover Township area has been primarily served by a public water supply that relies solely on groundwater, a water-distribution system model, integrated with spatial analysis technologies, is being used to reconstruct historical water-distribution system characteristics and investigate the question of exposure.

ATSDR has developed a model that simulates the 1998 patterns of the water-distribution system serving the Dover Township area. This effort, which is expected to be completed in 2000, will allow the New Jersey health department to assess the association of the occurrence of childhood cancer with exposure to each of the sources of potable water entering the distribution system, including ones known to be historically contaminated.

DOE's Paducah Gaseous Diffusion Plant Paducah, Kentucky

The Paducah Gaseous Diffusion Plant was put on EPA's NPL in 1994. Elevated concentrations of trichloroethylene (TCE) and technetium 99 (Tc-99) in offsite groundwater were first discovered in residential wells in 1988. There was no earlier off-site groundwater monitoring. After the site was placed on the NPL, ATSDR explored potential contaminant exposure pathways to off-site populations and started the public health assessment process.

In 1952 the plant started operations to enrich uranium 235 by a gaseous diffusion process. Early processes included limited production of uranium hexafluoride and uranium metal. Over time, TCE and Tc-99 contaminated local groundwater. ATSDR's investigations also found other conventional and radiologic contaminants in air, surface soils, sediments, and surface waters. These originated from different sources at the site.

ATSDR obtained approximately 700,000 data values, geo-locators for each sample station, and other data from the plant's environmental database. By incorporating these data into a GIS system, ATSDR was able to visualize patterns of contaminant concentrations in the different media and to integrate this information with demographic information for the vicinity. GIS provided both a visual image of areas affected and a numerical value representing the persons potentially affected by the contaminants in each media. It also generated a demographic breakdown of different types of populations. When sample locations were depicted graphically, areas that had not been sampled were easily identified. ATSDR also determined past plume migration and estimated exposure durations.

ATSDR evaluated potential exposure doses to airborne radionuclides using EPA's Clean Air Act Assessment Package and demographic and off-site distance information provided by GIS. ATSDR also performed an air dispersion analysis for TCE and hexavalent chromium and put the results of the analysis onto maps to determine potentially exposed populations.

ATSDR released a public health assessment that generally concluded that the offsite community was not exposed to contaminants at levels of public health concern during normal plant operation. It did find that in five residential wells, past exposures to maximum concentrations of TCE or lead posed a health hazard for two or three young children. Additionally, it determined that if new wells are drilled into the contaminated groundwater plume or old wells are used, exposures to maximum concentrations in the groundwater plumes would pose a future health hazard for children and adults.

Kelly Air Force Base
San Antonio, Texas

Members of the community neighboring Kelly Air Force Base, Texas, expressed concerns about fuel vapor odors and other odors coming from the base. They asked if there was a relationship between these odors and the occurrence of health effects, such as nausea, headaches, difficulty in breathing, and cancer. To determine if any emissions from the base could be linked to those symptoms, ATSDR gathered and researched several types of information, including historical information about the base, environmental information, health outcome data, and information provided by the community.

After reviewing information about the chemicals being emitted and their sources, ATSDR used an air dispersion model to estimate the dispersion of

those emissions and the resulting concentrations from the base. The model contained data from the base's emission inventory for a variety of carcinogenic compounds. The modeled results included the average annual and 1-hour maximum concentration estimates for each hazardous substance. In concert with the air dispersion modeling, ATSDR also used GIS, risk assessment, and health outcome data to identify geographic areas that needed further study because of a potentially elevated cancer risk. These areas were further analyzed with dose reconstruction, refined modeling activities, and additional health outcome data.

While the ATSDR scientists were gathering, reviewing, and evaluating environmental and health information, other staff worked to establish good lines of communication with the community members living at the base. This was done by arranging meetings, including one with a small focus group, another with a citizens' group, and other meetings to talk individually with community leaders. Additionally, a public meeting with a poster session drew about 100 attendees. ATSDR's staff members have focused on increasing the opportunity for closer interaction with Spanish-speaking community members at this site and recording of their health concerns. The staff members have translated information for community meetings, press releases, fact sheets, fliers, and public service announcements into Spanish.

ATSDR's public health assessment concluded that the community is not currently exposed to levels of contaminants from the base that would cause people to become sick, but that the community may have been exposed to higher levels of contaminants in the past. ATSDR recommended follow-up activities that involve health education and evaluation of health outcomes.

ENHANCING OUR WORK IN COMMUNITIES: SUPPORT SERVICES FOR THE PUBLIC HEALTH ASSESSMENT PROCESS

Community Involvement Program

The Division of Health Assessment and Consultation's Community Involvement Branch was established in 1998. By taking the lead in establishing and maintaining partnerships with communities near sites served by ATSDR, community involvement staff members are generally involved in most of ATSDR's site-specific activities, such as public health assessments and health consultations. Community involvement staff members facilitate collaboration and information exchange between ATSDR and communities and other government agencies involved at those sites. They provide an essential link between the community and the ATSDR scientists who are working to address the communities' health concerns and to protect public health.

Community involvement staff members also distribute fact sheets, press releases, and notices about upcoming meetings to keep communities informed. During FY 1999, copies of 225 different fact sheets and other materials were distributed to approximately 40,000 community members and other stakeholders. The increased use of community meetings that combine public availability sessions with poster sessions has provided an especially effective mode of information sharing. In these small group settings, community members can learn about ATSDR's activities, while they wait to share their health concerns individually with other ATSDR staff members. The Community Involvement Branch conducted 150 meetings, which were attended by about 4,400 community members.

Office of Tribal Affairs Established

In January 1999, ATSDR announced the establishment of an Office of Tribal Affairs within the Division of Health Assessment and Consultation. The office was established to better serve American Indian and Alaska Native populations by providing a central, identifiable point of contact. The Office of Tribal Affairs staff members are environmental health scientists with additional training and experience in tribal policy and culture.

American Indian and Alaska Native communities and governments' environmental public health needs are escalating. Many health concerns related to exposures from environmental contamination are being identified. The Office of Tribal Affairs staff members have begun to (1) provide cultural training for agency staff members, (2) provide tribal-cultural and policy expert assistance on site-specific projects (which may include direct technical responses), and (3) develop needed interagency coordination to address environmental health needs of American Indian and Alaska Native populations. Concerns at sites that the Office of Tribal Affairs has addressed include

- drinking water issues of the St. Regis Mohawk tribe,
- New England tribes' concerns about mercury in biota,
- concerns about cancer incidence and environmental exposures at the Alaska Native villages on St. Lawrence Island, Alaska, and
- surface water and groundwater contamination on the Pine Ridge Oglala Sioux Reservation.

In addition, the Office of Tribal Affairs works with an ATSDR Ad Hoc Tribal Workgroup to advise the agency on tribal programs and policies. The workgroup provided input to the agency's *Consultation and Coordination Policy With Indian Tribal Governments,* the Office of Tribal Affairs functional statement and communication efforts to others in Indian country, and advice on the tribal requests for an ATSDR National Tribal Forum on Environmental Health Needs. The forum is intended to establish needed collaborations between American Indian/Alaska Native governments and health departments, federal agencies, and academia to address the massive environmental public health issues of hundreds of tribal nations and thousands of native people.

Children's Health Initiative

Communities around Superfund sites often express concerns about childhood cancers and birth defects. Current guidance concerning toxicological evaluation of exposures to environmental toxicants is primarily focused on how to evaluate adult exposures to environmental toxicants. ATSDR convened a workshop in FY 1999 to develop a plan for providing more guidance on evaluating children's exposures.

On August 4–5, 1999, the Division of Health Assessment and Consultation and the ATSDR Office of Children's Health sponsored a Workshop on Children's Health Issues. The workshop examined how ATSDR's public health assessment activities evaluate children's exposure to environmental toxicants. Participation and input were solicited from child health advocates; health organizations; tribes; and local, state, and federal governments. ATSDR is developing a plan based on the following recommendations made in the workshop.

- ATSDR should consider the age and stages of human development (i.e., fetus, infant, toddler, child, and adolescent), cultural and socioeconomic factors, and geographic location of children when evaluating potential childhood exposures to hazardous substances.
- ATSDR should sponsor a definitive childhood soil ingestion study that considers the various activities and behaviors, including pica, of infants, toddlers, children, and adolescents.
- Health assessors should receive training and guidance on the use, collection, and limitations of birth defects and cancer registry data and information. Health assessors should also be provided with current information about the susceptibility of the fetus and children during various stages of development.
- Health assessors should be provided information about organ system stages of development (fetal, infant, toddler, child, and adolescent) and how that could affect susceptibility.

Chapter Two: Toxicologic Research and Information Dissemination

The Division of Toxicology is composed of three branches under the Office of the Division Director: the Emergency Response and Scientific Assessment Branch, the Research Implementation Branch, and the Toxicology Information Branch. The division is responsible for substance-specific research and technical assistance; dissemination of technical information; and emergency technical support to industry, local first responders, other government agencies, and the public.

Identification and Ranking of Hazardous Substances

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, or Superfund) Priority List of Hazardous Substances contains the names of 275 substances found at NPL sites and that are believed to pose the most significant potential threat to human health. This list helps form ATSDR priorities on many issues. The Superfund Amendments and Reauthorization Act of 1986 (SARA) requires ATSDR to compile this priority list, which is drawn from the universe of hazardous substances known to exist at NPL sites. The ranking of substances on the list is based on three criteria: (1) frequency of occurrence at NPL sites, (2) toxicity, and (3) potential for human exposure.

To ensure that the most hazardous substances are on the priority list, ATSDR periodically reexamines its information database (HazDat) of hazardous substances known to exist at NPL sites. The list is updated annually and published biennially because EPA routinely adds new sites to the NPL, new data about how people might be exposed becomes available as public health assessments are completed, and important new toxicity information about substances is discovered. Each substance on the list may become the subject of an ATSDR toxicological profile and subsequently a candidate for the identification of priority data needs.

In late FY 1999, the preparatory work and most of the development of the 1999 CERCLA Priority List of Hazardous Substances was completed. The final 1999 list was published and its availability announced in the *Federal Register* during the first quarter of FY 2000. Arsenic was at the top of the 1999 list, followed by lead and mercury. The top 10 substances are shown in Table 1.

Table 1. Top 10 Substances on the 1999 Priority List of Hazardous Substances

Rank	Name
1	Arsenic
2	Lead
3	Mercury
4	Vinyl chloride
5	Benzene
6	Polychlorinated biphenyls (PCBs)
7	Cadmium
8	Benzo(a)pyrene
9	Polycyclic aromatic hydrocarbons (PAHs)
10	Benzo(b)fluoranthene

In June 1999, Congressman John Dingell's office contacted ATSDR to request that the agency provide information on adverse effects associated with the top 50 substances on the Priority List that have latency periods of 6 years or greater. In response, the Division of Toxicology reviewed and compiled the information available in the existing toxicological profiles. The report noted that vinyl chloride, benzene, PCBs, trichloroethylene, hexavalent chromium, lead, arsenic, creosote, and benzidine are classified as "known to cause cancer in humans" or "probable human carcinogens," and they have a latency period of at least 6 years. In addition, a number of other substances on the list are classified as "reasonably anticipated to cause cancer in humans" because of limited evidence in humans, but sufficient evidence in animals. These substances include cadmium, chlordane, beryllium, carbon tetrachloride, and cobalt. The consultation also summarized the potential for developmental or neurologic effects with a latency of 6 years. This information was subsequently published as a scientific manuscript, "ATSDR's 1997 Priority List of Hazardous Substances: Latent effects—Carcinogenicity, Neurotoxicology, and Developmental Deficits in Humans and Animals" (*Toxicology and Industrial Health* 1999; 15:1–43).

Along with the priority list, ATSDR developed a Completed Exposure Pathway Site Count Report. A completed exposure pathway is an exposure pathway that links a contaminant source to a receptor population. The completed exposure pathway ranking is based on a site frequency count, and thus lists the number of sites at which a substance has been found in a completed exposure pathway. In late FY 1999, most of the development of the completed exposure pathway report was completed. Lead was the substance found most frequently in completed exposure pathways, followed by trichlorethylene and arsenic. The top 10 substances are shown in Table 2.

Table 2. Number of Sites with a Hazardous Substance in a Completed Exposure Pathway

Substance Name	All Sites	NPL Sites
Lead	298	206
Trichloroethylene	277	239
Arsenic	215	147
Tetrachloroethylene	206	167
Benzene	149	116
Cadmium	148	105
Chromium	146	102
Polychlorinated biphenyls	130	96
1,1,1-Trichloroethane	116	97
Zinc	116	75

PREPARATION OF TOXICOLOGICAL PROFILES

CERCLA, as amended, requires ATSDR to prepare toxicological profiles that examine each hazardous substance on the CERCLA Priority List of Hazardous Substances. These profiles summarize the current scientific literature and interpret available toxicologic and epidemiologic information to determine levels of significant human exposure for the substance.

ATSDR also provides toxicological profiles at the request of the U.S. Department of Defense (DOD) and the U.S. Department of Energy (DOE). During FY 1999, ATSDR personnel developed or updated 44 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 list of toxicological profiles completed in FY 1999.)

CERCLA

In FY 1999, ATSDR published 20 updated or new toxicological profiles (see Appendix B). Eight toxicological profiles underwent public-comment review, after which relevant information identified during the review process was incorporated. These profiles will be published in final form in FY 2000. Eight toxicological profiles under development during FY 1999 will be distributed for a 90-day public-comment period.

U.S. Department of Defense

Five toxicological profiles were finalized in FY 1999 for DOD. One toxicological profile (for total petroleum hydrocarbons) underwent a public-comment review and was updated to incorporate relevant information identified during the review process. This profile will be finalized in FY 2000.

U.S. Department of Energy

Draft toxicological profiles for uranium and ionizing radiation were developed for DOE during FY 1999 and will be released for a 90-day public-comment period in FY 2000. These profiles will be published in final form in FY 2000.

Child Health In Toxicological Profiles

During FY 1999, the Division of Toxicology developed 35 toxicological profiles highlighting children's health issues by using *Child Heath: Guidance for the Preparation of Toxicological Profiles.* The guidance has been published as an appendix in *Promoting Children's Health: Progress Report of the Child Health Workgroup, Board of Scientific Counselors With New Guidance for Toxicological Profiles, 1998-1999*. A section on how to incorporate child health concerns has now been included in the *Guidance to Prepare Priority Data Needs Documents*. The toxicological profiles developed using the new guidance are now available either as drafts for public comment or in final form.

Expanded Distribution of Toxicological Profiles

In FY 1999, 118 toxicological profiles were available on CD-ROM. The CD-ROM was developed under a cooperative research and development agreement with ATSDR and published by CRC Press. During FY 1999, ATSDR continued a quality control project to update and complete the process of placing all public health statements of final toxicological profiles on the agency's Internet site.

Fact sheets (ToxFAQs) containing material drawn from ATSDR public health statements have also been developed. ATSDR now has a total of 111 fact sheets in print and posted on the Internet.

IMPLEMENTATION OF A SUBSTANCE-SPECIFIC APPLIED RESEARCH PROGRAM

ATSDR is working to determine the relationships between adverse human health outcomes and hazardous substances through its Substance-Specific Applied Research Program. CERCLA, Section 104(i)(5), requires that for each hazardous substance listed, ATSDR, in consultation with EPA and other public

health agencies and programs, assess whether adequate information is available on the health effects of the substance. Furthermore, the law requires that ATSDR, in cooperation with the National Toxicology Program, initiate a research effort designed to determine the health effects of those substances for which adequate information is not available (or under development).

ATSDR used several mechanisms to fill priority data needs in FY 1999. These included industry testing through EPA, private-sector voluntarism, and academic-based research conducted through the Minority Health Professions Foundation. Additional research needs are being addressed through other agency programs (e.g., an interagency agreement with the National Toxicology Program and ATSDR's Great Lakes Human Health Effects Research Program). Significant progress has been made in filling these key research needs. Through FY 1999, ATSDR has identified 201 priority data needs. A total of 117 priority data needs are being addressed via these mechanisms. In addition, 39 priority data needs have been reclassified as data needs, and 14 priority data needs have been filled. Data obtained from the research program are used to update ATSDR toxicological profiles and to develop health-guidance values for hazardous substances evaluated in ATSDR's public health assessments conducted at waste sites.

Industry Testing Through EPA

The Toxic Substances Control Act of 1976 (TSCA) authorizes EPA to ensure that chemicals are safe for their intended use. EPA places some of this responsibility on chemical manufacturers and processors by requiring them to conduct toxicologic testing. Costs of conducting this research are completely borne by the industries.

Substances with some research needs to be addressed by TSCA test rule

Benzene
Chloroethane
Hydrogen cyanide
Methylene chloride
Sodium cyanide
Tetrachloroethylene
Toluene
Trichloroethylene

During FY 1999, ATSDR and EPA finalized information to support development of a TSCA test rule for eight substances that ATSDR previously had identified as having research needs. A test rule is the legally enforceable document that describes (1) EPA's authority to require testing, (2) the specific testing required, (3) why it is required, and (4) who should conduct the testing. The proposed test rule will address substance-specific research needs identified in ATSDR's priority data needs documents. Publication of the proposed test rule is expected in the summer of 2000.

Private-Sector Voluntarism

ATSDR encourages industry to voluntarily conduct needed research into the toxicity of priority chemicals. During FY 1999, ATSDR had memoranda of understanding (MOU) in place with three private-sector organizations—General Electric Company (GE), Halogenated Solvents Industry Alliance, Inc. (HSIA), and Chemical Manufacturers Association (CMA)—to address some research needs for five substances.

Substances with some research needs being addressed by private-sector voluntarism

Methylene chloride

Polychlorinated biphenyls

Tetrachloroethylene

Trichloroethylene

Vinyl chloride

Methylene Chloride

During FY 1999, ATSDR signed a second MOU with HSIA that covers an immunotoxicity study on methylene chloride, a substance found in at least 809 National Priority List sites. HSIA has completed the study and the final report is pending. This study addresses an important research need for methylene chloride, i.e., to determine if the immune system is a susceptible target organ for this chemical.

Study of Four Polychlorinated Biphenyl Mixtures

The MOU with GE includes a study to investigate environmental biodegradation of four polychlorinated biphenyl (PCB) mixtures (Aroclor 1016, Aroclor 1242, Aroclor 1254, and Aroclor 1260). During FY 1999, ATSDR accepted the final report of this study, thus completing all the studies covered under this MOU. The findings of the GE studies have filled three ATSDR research needs for these mixtures that rank sixth on the agency's Priority List of Hazardous Substances.

Minority Health Professions Foundation Research Program

The Minority Health Professions Foundation (MHPF) Environmental Health and Toxicology Research Program, a partnership with seven minority health-professions schools, is designed to fill critical research needs and provide a major source of research data for the Substance-Specific Applied Research Program.

Research findings from this program have expanded the data base used by ATSDR health scientists for evaluating the potential human health risk for people exposed to toxic substances in the environment, and contribute to the public health service agenda of the agency. Some examples of research findings from the program include the following:

- Levels of aryl hydrocarbon hydroxylase, an enzyme involved in metabolism of certain chemicals in the body, correlate with exposures to polycyclic aromatic hydrocarbons. This enzyme may prove to be a viable biomarker.

Minority Health Professions Foundation Institutions

Charles R. Drew University of Medicine and Science

Florida A & M University

Meharry Medical College

Morehouse School of Medicine

Texas Southern University

Tuskegee University

Xavier University

- In a study on rats, oral exposure to mercury induced an increase in blood cholesterol across two generations. This may indicate that adults exposed to mercury (and their children) could be at risk for altered cholesterol metabolism.
- Lead in the soil may contribute as much or more to inner-city children's body burden than lead from paint.
- Bone-lead stores from past exposures may contribute to hypertension during pregnancy by increasing the pool of bioavailable lead in the women's serum.

Great Lakes Human Health Effects Research Program

The Great Lakes Human Health Effects Research 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. This ATSDR-supported research program studies known at-risk populations to further define the human health consequences of exposure to persistent toxic substances identified in the Great Lakes Basin. In FY 1999, 11 manuscripts and nine abstracts describing research under this program were published and presented at professional conferences. To date, the program has published more than 38 manuscripts in peer-reviewed journals.

During FY 1999, program accomplishments included the following:

- ATSDR, in collaboration with EPA, has updated the manuscript, *The Public Health Implications of Exposure to Polychlorinated Biphenyls (PCBs)*, as part of the Clean Water Action Plan for FY 1998. The recent research findings of the Great Lakes research program are an essential component of this paper. This publication is accessible through the ATSDR Web site and will be published in *Toxicology and Industrial Health*. In addition, ATSDR provided Great Lakes research findings for the EPA Clean Action Plan annual report for FY 1999.

- ATSDR, in collaboration with Health Canada, has published the proceedings of the international scientific conference on the effects of persistent toxic substances in the Great Lakes and St. Lawrence River Basins on human health and the environment. These proceedings are in the *Journal of Environmental Research -Special Issue: Proceedings of Health Conference '97 — Great Lakes/ St. Lawrence* (De Rosa et al. 1999; 80(Suppl 2):1-248).

Institutions Receiving Awards for Great Lakes Research

Michigan Department of Health

Michigan State University

New York State Department of Health

Research Foundation of State University of New York at Buffalo

State University of New York at Oswego

University of Illinois at Chicago

University of Illinois at Urbana-Champaign

University of Wisconsin-Milwaukee

Wisconsin Department of Health and Family Services

- ATSDR presented research findings at the International Joint Commission Great Lakes Science Advisory Board's Meeting to Assess Scientific Issues in Relationship to Lake Wide Management Plans. These findings were used to assist the Lake Wide Management Plan committees in incorporating human health issues in the development of their management plans for each Great Lake as mandated by the International Joint Commission.
- ATSDR presented research findings at two meetings of the United Nations Intergovernmental Negotiating Committee for an International Legally Binding Mechanism for Implementing International Action on Certain Persistent Organic Pollutants (POPs). These presentations discussed the potential adverse health effects from exposure to POPs chemicals such as PCBs, dioxins, furans, dieldrin, and DDT. In addition, these presentations supported the role of one of our partners, the Physicians for Social Responsibility, in informing the international audience about the public health implications of exposure to POPs. These chemicals are the same toxic substances being investigated in the Great Lakes research program.
- ATSDR, through risk communication and health intervention strategies, reduced the fish consumption rate of men of one Native American tribe from approximately 100 meals per year to 40, and even lower during the second year (approximately 25 meals per year). Their body burden levels of PCBs were also reduced due to lower fish consumption. A similar trend was also observed in the women.
- ATSDR, in collaboration with EPA Great Lakes National Program Office, contributed to the United States Report on the Great Lakes Ecosystem. This report fulfills the reporting requirements under

section 118 of the Clean Water Act and the United States – Canada Great Lakes Water Quality Agreement.

- ATSDR, in collaboration with EPA, contributed to the United States Response to the International Joint Commission's (IJC) 9th Biennial Report on Great Lakes Water Quality. Research findings from the Great Lakes program in the three areas of exposure, sociodemographics, and health effects were an important component of this response to IJC.

Recent research findings include:

- A significant trend of increasing body burden is associated with increased fish consumption;
- Knowledge of and adherence to health advisories for Great Lakes sport-caught fish varies across different populations;
- Eighty percent of minorities who had eaten Great Lakes sport-caught fish were unaware of a fish advisory, and awareness was especially low among women;
- Maternal consumption of Lake Ontario Great Lakes fish increases the risk for prenatal exposure to the most heavily chlorinated PCBs; and
- Infants who had been exposed prenatally to the most highly chlorinated PCBs had poorer performance on the habituation and autonomic tests of the Neonatal Behavioral Assessment Scale (NBAS) when tested 25–48 hours after birth than did infants who were not exposed. No significant relationship was found between PCBs of lesser chlorination, dichlorodiphenyldichloroethylene (DDE), hexachlorobenzene, mirex, or lead and any NBAS performance test. The children are now 3 years old, and initial new test results for memory, verbal, and perceptual performance indicate their scores are lower than those of children whose mothers consumed low amounts of fish or no fish.

Chemical Mixtures Research Program

The principal aim of this program is to develop methods for assessing the joint toxicity of exposure to multiple chemicals that are frequently found at hazardous waste sites. During FY 1999, ATSDR supported experimental research at universities that has enhanced the understanding of the various steps and underlying mechanisms of toxicity following exposure to chemical mixtures. These research findings have been presented at national and international meetings of toxicology in eight separate oral and poster presentations.

- Researchers at Colorado State University are studying the toxicity of mixtures of arsenic, cadmium, chromium, and lead in human keratinocytes (skin cells). The results show that the joint toxicity is either additive or antagonistic when compared with effects found for the individual chemicals. Similar observations were made in Syrian

hamster embryo cells when using a mixture of lead, arsenic and chromium. Several cellular and molecular biomarkers are being studied. Researchers have also been testing a mixture of arsenic, 1,2-dichloroethane, trichloroethylene, and vinyl chloride.

- Mixtures of environmental chemicals such as polycyclic aromatic hydrocarbons (PAHs) are difficult to characterize, both analytically and toxicologically. Researchers at Texas A&M University have developed two microbial assays that can be used to provide an estimate of genotoxicity (i.e., whether a substance can damage DNA). In parallel studies, spleen cells in culture are being used to study the immunotoxic (whether a substance is toxic to the immune system) effects of mixtures. Together these assays can be used to study a variety of potential toxic effects of environmental mixtures.
- Researchers at North Carolina State University are studying the dermal absorption of environmental chemical mixtures. The influence of other chemicals on the absorption of mixtures of polychlorinated biphenyls (PCBs) and pentachlorophenol (PCP) is being studied using an in vitro method.
- Northeast Louisiana University researchers are studying recovery and repair mechanisms following exposure to trichloroethylene (TCE), thioacetamide, allyl alcohol, and chloroform. The roles of these chemicals and their metabolites in eliciting tissue repair and injury are being studied. After evaluating individual chemicals, detailed mixtures studies are planned.
- At Wayne State University, experiments were performed to compare the interactive toxicity of simple mixtures of toxic metals in primary cultures of rat liver cells, rat osteoblastic bone cells, and monkey kidney cells. The liver cells were found to be most sensitive and the osteoblastic bone cells were least sensitive to mixtures of mercury and cadmium. These results underscore the need for investigators and risk assessors to be aware of parameters such as target organ sensitivity in the overall expression of toxicity of a mixture.

EMERGENCY RESPONSE

ATSDR provides technical assistance 24 hours a day to federal, state, and local government and emergency-response organizations during emergency situations resulting from unplanned releases of hazardous substances. Emergency-response coordinators have immediate access to assistance from ATSDR experts in the areas of chemistry, toxicology, medicine, and environmental science. Site-specific consultation teams can usually be convened within 20 minutes of notification to provide support. On-site response can be provided anywhere in the continental United States, usually within 8 hours of a request.

Acute-release events

In FY 1999, at the request of EPA's regional offices, other federal agencies, and state and local agencies, ATSDR emergency-response personnel responded to requests for information related to 42 (13%) acute events, 227 (42%) time critical requests, and 247 (45%) non-time critical requests. Emergency-response staff provided on-site assistance for one acute and two nonacute events. During these emergencies, ATSDR helped first responders address the public health needs of about 190 people who were injured and another 3,663 people who were otherwise affected because of airborne dispersion or who had to be temporarily evacuated. Thirteen percent of acute-event calls reported injuries, and 37% reported other problems. The majority of acute release event calls concerned air releases during a spill or fire in an urban residential or urban industrial/commercial setting east of the Mississippi River from January through March, 1999.

Most requests for information during acute chemical releases were from EPA, local responders, state agencies, or the federal on-scene coordinator. For incidents other than acute releases, the most frequent requesters for time-critical support were private citizens, with EPA as the second most common.

The majority of chemical releases resulting in a call to ATSDR involved releases to the air (both indoor and ambient, 67%) in an urban residential or industrial/commercial environment (57%). ATSDR also assisted EPA and local responders in identifying response options to protect public health.

Child Health in Medical Management Guidelines

ATSDR wrote a guidance manual—*1999 Guidance for Developing Chemical Protocols (New or Updated) for Medical Management Guidelines for Acute Chemical Exposures*—for incorporating pediatric concerns into ATSDR's Medical Management Guidelines ("Managing Hazardous Materials Incidents"). The Medical Management Guidelines are a series of three volumes aimed at first responders to emergency hazardous waste releases. The first two volumes are general, describing procedures and situations common to all hazardous chemical releases. The third volume is chemical-specific.

Major activities

Following are summaries of some of the major activities in which ATSDR emergency-response personnel were involved during FY 1999:

Harris County Mercury Spill, Houston, Texas: ATSDR assisted the Harris County Health Department in Houston in its response to a mercury spill at the headquarters of a nonprofit organization. The facility housed a prenatal care clinic and administrative offices. In addition, noontime meals for the assisted target population were prepared in the kitchen and transported to clients'

homes. Mercury was spilled in the clinic from a damaged sphygmomanometer (a blood pressure measuring device). Concentrations found in the clinic area were in excess of the American Council of Governmental Industrial Hygienists' threshold limit value for industrial locations. ATSDR recommended an indoor action level and additional precautions to prevent exposure of children and pregnant women. On the basis of ATSDR's recommendations, Harris County temporarily closed the clinic and required cleanup of the mercury contamination.

New Carlisle Water System, New Carlisle, Ohio: At the request of the Ohio Department of Health, ATSDR provided a hazard assessment for inorganic mercury salt found in a drinking water well that was measured at 20 parts per billion, slightly above regulatory levels. Approximately 7,000 people were served by the water system. The well water became contaminated when a seal containing inorganic mercury salt broke on a submersible pump used in the well. The water from the well was added to the output of other wells and then treated before entering the water system. Residents were temporarily advised by the state not to use their water for washing, drinking, or cooking until it could be determined that the mercury was adequately removed by the treatment process. Because of the form of mercury present initially and the dilution as it entered the water system, ATSDR concluded that the human health hazard from the contaminated well was minimal. There was no detectable mercury in the water after treatment.

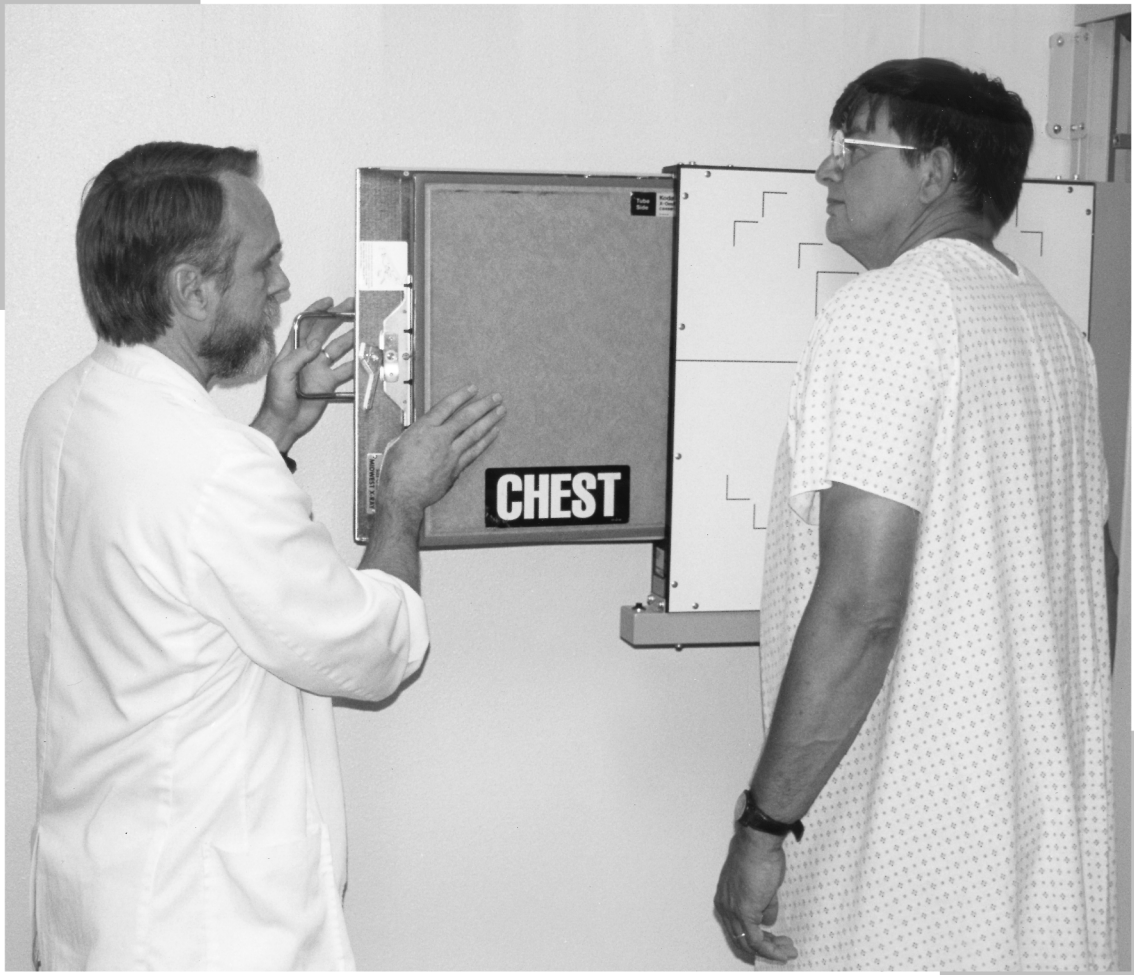
Dairy Cattle Fluoride Exposure, Boyertown, Pennsylvania: A dairy herd in southeastern Pennsylvania became the focal point for a rural community's concerns regarding excess exposure to fluoride compounds emitted by a manufacturing facility. EPA confirmed the presence of elevated fluoride levels in forage crops fed to cattle and requested ATSDR's assistance in investigating reported dental lesions, lameness, and decreased milk production in the herd. ATSDR and EPA's Environment Response Team visited the site twice and observed postmortem examinations of three cows from the herd by pathologists at the New York Veterinary Diagnostic Laboratory. An evaluation of the herd's records for milk production and reproductive efficiency was performed in consultation with the herd health specialist at the University of Pennsylvania. After reviewing toxicologic and other data, ATSDR concluded that the herd had some early signs of excess fluoride body burden. However, the fluoride body burden was well below levels that would cause fluorosis, a condition marked by dental lesions, exostoses, and lameness.

Tire Fire, Sycamore, Ohio: At the request of the local health department, ATSDR reviewed air and surface water sampling data for a large tire fire that occurred in Sycamore. ATSDR recommended additional air sampling because data were limited. On the basis of water data, which were more extensive, ATSDR recommended that a temporary fish advisory be continued. The Sycamore Tire Dump is one of the largest scrap tire dumps in the eastern United States.

ATSDR INFORMATION CENTER

The Superfund Amendments and Reauthorization Act of 1986 broadened ATSDR's responsibilities in the area of information dissemination. The ATSDR Information Center, which is part of the Division of Toxicology, contributes to agency activities designed to meet this responsibility by providing scientific and technical information to support ATSDR staff, agency constituents, and the public.

The Information Center received more than 77,250 requests for technical information assistance and distributed more than 284,210 documents during FY 1999. Most of the requests for information came from private citizens. In FY 1999, ATSDR's toll-free telephone system (1-888-42-ATSDR [1-888-422-8737]) received approximately 9,650 calls, about 3,000 more calls than FY 1998. ATSDR's Web site was accessed by more than 500,000 visitors in FY 1999.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CHAPTER THREE: CONDUCTING 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 contamination in the environment to the possible presence of illness in people who have been exposed.

Since 1990 ATSDR has evaluated seven priority health conditions to assess the association between adverse health outcomes and exposures to hazardous substances and to determine agency strategies to address them.[1] These health conditions are as follows:

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

This paradigm allows ATSDR to concentrate its activities on those adverse health effects considered to be most sensitive to exposures to hazardous substances and to systematically contribute to the knowledge base about the adverse health effects. ATSDR also conducts studies to evaluate biological dose estimates of hazardous substances.

The following are descriptions of findings from studies completed in FY 1999.

[1] ATSDR. 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.

BIRTH DEFECTS AND REPRODUCTIVE DISORDERS

Risk slightly increased for birth defects

Birth Defects Among Children of Racial or Ethnic Minority Born to Women Living in Close Proximity to Hazardous Waste Sites—California, 1983–1988. This population-based, case-control study evaluated the relationship between birth defects in racial or ethnic minority children (i.e., Black/African American, Hispanic/Latino, American Indian/Alaska Native, Asian/Pacific Islander) and their potential exposure to contaminants from NPL sites in California. Almost 14,000 racial or ethnic minority infants with major structural birth defects were included in the study, which covered the period 1983–1988. Case subjects were identified by the California Birth Defects Monitoring Program. For comparison, a control group of about 14,500 infants was randomly selected from vital records of infants not reported to the birth defects monitoring program.

The study found that racial or ethnic minority infants whose mothers had lived in a census tract with an NPL site were at slightly increased risk for birth defects. The risk was highest for neural tube defects and musculoskeletal defects. In the analyses by racial or ethnic group, all groups except Black/African American had an increased risk for neural tube defects. The study also found that there was a significantly elevated risk for anencephaly among infants whose mothers lived near sites contaminated by volatile organic compounds, pesticides, or cyto-oxidase inhibitors (cyanides and hydrogen sulfide). Only Blacks/African Americans were at increased risk for integument defects, and only American Indians/Alaska Natives were at increased risk for oral clefts. Conotruncal heart defects and all heart or circulatory defects were not elevated in any group.

Waste sites and hazardous materials are often located in ethnic and racial minority communities. The potential impact these have on minority populations is of concern, especially when these groups already face many social and economic disadvantages that place them at risk for adverse pregnancy outcomes. Previous studies have linked various adverse reproductive health effects, including low birth weight and birth defects, with potential exposure to substances from hazardous waste sites.

Iodine-131 may be associated with preterm birth

Hanford Infant Mortality and Fetal Death Analysis, 1940–1952. People living in communities surrounding the Hanford Department of Energy facility in southeastern Washington were exposed to radionuclides, particularly iodine-131, during 1945 through 1951. This study was conducted to determine if exposure to iodine-131 (estimated through exposure dose reconstruction) was a risk factor for infant mortality, fetal death, and preterm birth in the years of highest releases from Hanford, 1945 and 1946.

The study used birth records and fetal and infant death records from 1940 through 1952 for an eight-county area surrounding the Hanford facility. The Hanford Environmental Dose Reconstruction project provided iodine-131 dose estimates for the period 1945 through 1952. The analysis included 72,154 births, 1,957 infant deaths, and 1,045 fetal deaths that occurred during the 13-year study period.

The study findings suggested that living in an area with relatively high estimated iodine-131 exposure in 1945, the year of the largest iodine-131 releases, may have had an effect on the fetus or the mother that resulted in preterm birth. High estimated iodine-131 exposure in the latter part of pregnancy was also associated with preterm birth and was somewhat associated with infant mortality. Additionally, the "high exposure area" had a lower infant mortality rate than did the "low exposure area" for nearly every year from 1940 through 1952, except for 1945 and 1946, the period when exposures were highest. Examination of causes of death did not reveal many differences for infant or fetal deaths by exposure groups in 1945.

Overall, it appears that iodine-131 exposure may be associated with preterm birth; however, there is no clear explanation for the finding. The modest increase in infant mortality in the high exposure group supports findings of other studies. Further research on more contemporary populations may be warranted. Assessment of the effects of iodine-131 exposure on other birth outcomes, such as birth weight, would also be useful.

CANCER

Study finds little consistency across study areas

Cancer Incidence in Populations Living Near Radiologically Contaminated Superfund Sites in New Jersey. The relationship between cancer incidence and residence near radiologically contaminated hazardous waste sites in New Jersey was examined. Cancer incidence data from 1979 through 1991 were collected for six towns contaminated by three Superfund sites:

- the U.S. Radium site in Orange;
- the Montclair/West Orange Radium Site located in Montclair, West Orange, and Glen Ridge; and
- the Welsbach and General Gas Mantle Contamination Sites located in Camden City and Gloucester City.

The objective was to evaluate whether the population residing closest to the contaminated areas had elevated incidence of cancer. Cancer data from the New Jersey State Cancer Registry, a population-based cancer incidence registry, were used for the study. Standardized incidence ratios (SIRs) were calculated for all cancers combined and eleven site-specific cancers. Males and females were evaluated separately, and all races were combined in the analyses. Expected numbers were calculated using average state incidence rates and U.S. census data to estimate the population.

In comparison with average state rates, the number of newly diagnosed cancers in the total study population was not higher than expected for all cancer combined or any of the 11 type-specific cancer groupings. The U.S. Radium area had significantly lower total cancer incidence, while the Welsbach/General Gas Mantle areas had significantly higher total cancer incidence and total cancer incidence in males. The higher total cancer incidence for the Welsbach sites appears to be due to significantly higher lung cancer incidence in this population. While total cancer incidence was unremarkable for the Montclair/West Orange Radium sites, total pancreatic cancer and thyroid cancer incidences among females were significantly higher than expected.

When the study area was reduced to the areas closest to the sites (about one city block), only one SIR remained significant. Lung cancer incidence for the total population near the Welsbach/General Gas Mantle sites remained significantly higher than expected. SIRs for the closest areas were similar to those for the total areas, but these were based on smaller observed and expected numbers. Only two cases of thyroid cancer were diagnosed among residents of the closest area; neither of the two patients resided near the Montclair/West Orange sites.

These data should be interpreted cautiously. The study design had numerous limitations, including the inability to assess past individual exposure levels, the lack of knowledge about the length of residence for case subjects, the potential impact of population migration, and the absence of information on other risk factors, such as occupational exposures or personal lifestyle habits.

In conclusion, this study found little consistency in the results across the study areas.

Lung cancer incidence was significantly elevated near the Welsbach/General Gas Mantle sites, and total pancreatic cancer incidence and incidence of thyroid cancer in females were significantly elevated near the Montclair/West Orange sites. However, information on important confounding factors that might explain the elevations was not available for the analysis.

Non-Hodgkin's lymphoma incidence elevated among males

Cancer Occurrence by Common Drinking Water Source, Broome County, New York, 1981–1990. The New York State Department of Health conducted this health statistics review to assess cancer statistics in Broome County for 1981 through 1990. The county's drinking water supplies were previously found to contain volatile organic compounds (VOCs) at levels exceeding the state drinking water guidelines. These water supplies were either treated or taken out of service. A previous study in 1986 evaluated the number of cancer cases occurring from 1976 through 1980 in areas of the county in which drinking water had been contaminated. This early study found no consistent patterns of elevated levels of cancer occurrence in the study areas.

The follow-up study evaluated data from 1981 through 1990 and used census block groups to more precisely define the study areas. Incidences of cancers of the stomach, colon, rectum, liver, lung, bladder, kidney, and brain, and of non-Hodgkin's lymphoma and leukemia were evaluated for areas of Broome County (portions of Vestal, Endicott, Conklin, and Colesville). Numbers of cancer cases were obtained from the New York State Cancer Registry. The expected numbers of cancer cases were calculated using the 1983–1987 standard incidence rates by sex, age group, and population density.

As in the 1986 study, no consistent patterns of excesses or deficits of the 10 different types of cancer were seen. No type of cancer showed a significant excess in both males and females when analyzed separately in any of the study areas. When all 10 types of cancer were combined, none of the study areas had a significant excess or deficit among males, females, or males and females combined. In the Vestal 1-1 study area, however, non-Hodgkin's lymphoma was significantly elevated. Most of the excess cases occurred in males. The drinking water in the Vestal 1-1 study area had the highest level of trichloroethylene of the areas included in this study.

This follow-up study provides an additional example where trichloroethylene (TCE) has been associated with an adverse health effect, i.e., cancer. The carcinogenicity of TCE has been debated over the last several years. Although this study was not conducted with sufficient power to provide a definitive answer to the TCE carcinogenicity question, it does supply a small addition to the weight of evidence.

LUNG AND RESPIRATORY DISEASES

Odors associated with increased respiratory illness

A Panel Study of Acute Respiratory Outcomes, Staten Island, New York. In response to community concerns regarding landfill emissions and air pollution near Fresh Kills Municipal Landfill on Staten Island, ATSDR conducted a panel study to investigate whether odor and air pollutants emanating from the landfill were associated with respiratory health effects among persons diagnosed with asthma. The investigation was conducted during the summer season when landfill emissions were highest and potential confounders were lowest. One hundred forty-eight persons, aged 15–65 years old, who had been diagnosed with asthma, were followed for a 6-week period. Participants were asked to complete a daily diary while ambient air measurements in their residential area were collected. Hydrogen sulfide, wind direction, and odor were selected as indicators of landfill emissions.

Results of the investigation showed a relationship between self-reported odor and measures of respiratory illness. This relationship was stronger among particular subgroups within the study population. Measurements of hydrogen sulfide did not appear to be associated with either measure of respiratory illness. A slight relationship was seen between a change in peak flow from

morning to evening and both whether a participant's residence was downwind from the landfill and the odor index for a particular day, as reported by the independent odor panel.

This investigation is the first to address longstanding community concerns about potential respiratory health risks from landfill emissions. The results of this investigation suggest that the perception of certain odors (garbage or rotten eggs) is associated with a worsening of respiratory health among some persons with asthma who live near the landfill. Future investigations of the potential health effects associated with the impact of the landfill should seriously consider the role of odor perception among residents.

Respiratory symptoms increased during excavations

Surveillance of Health Conditions Reported During Clean-up Actions at the Ralph Grey Trucking Site, California. The California Department of Health Services conducted a surveillance study to assess whether illnesses were associated with the cleanup of the Ralph Gray Trucking Company NPL site in Orange County. The former industrial site was redeveloped as a 73-home residential area in the 1950s and 1960s. The site contains wastes from the refining of high-octane aviation fuel, which had been placed in unlined trenches in the 1930s. Wastes from the site had oozed up into lawns and swimming pools of residents. EPA chose to remove the buried waste and contaminated soil and dispose of it off site.

The surveillance study was conducted because the excavation was anticipated to release sulfur dioxide and other chemicals. Relatively low levels of sulfur dioxide can cause broncho constriction (similar to asthma), especially in persons with respiratory problems. A baseline survey (n=271) was conducted to identify a panel primarily composed of people with respiratory sensitivities (n=36). They were asked to report daily respiratory symptoms and odors. Exposures included sulfur dioxide measurements and daily tonnage of waste removed.

The study found that the group of residents who had respiratory problems reported increased wheezing and coughing when excavation of wastes from the NPL site was greatest. Wheezing and coughing were significantly associated with tonnage of waste removed, especially on days when the highest amounts of waste were removed.

Although wheezing and coughing were found to be associated with the removal of wastes, associations were not found when exposure was based on sulfur dioxide. This difference could be because of differences in the tonnage and sulfur dioxide datasets or due to the possibility that symptoms were related to particulates rather than sulfur dioxide. Upper respiratory symptoms were found to be associated with sulfur dioxide, and weak relationships were found with sulfur dioxide and nausea and burning sensations of the nasal passages.

This evaluation provides evidence of measurable health effects that can be related to emissions. In addition, the study methods, which used individual

diaries of residents living near the site, provided a useful method of assessing this problem. The diaries provided a better method of recording effects by reducing participants' recall bias and also provided a good opportunity for community members to participate in the evaluation.

STUDIES WITH MULTIPLE HEALTH ENDPOINTS

TCE Subregistry Reports

The TCE Subregistry Baseline data file includes information collected on 4,986 persons (4,652 living, 334 deceased) with documented environmental exposure to TCE who had resided in 15 areas in five states (three sites in Michigan, four in Indiana, six in Illinois, one each in Pennsylvania and Arizona). TCE registrants were exposed through drinking water from TCE-contaminated private wells. The health outcome rates in the TCE Subregistry Baseline, Follow-ups 1 and 2 data (for all sites), and Follow-up 3 (for Illinois, Indiana, and Michigan) were compared with composite morbidity rates from the 1989–1994 National Health Interview Survey (NHIS), administered by the National Center for Health Statistics.

Morbidity data analyses indicated TCE Subregistry registrants had an increased reporting rate for several health outcomes, most of which were consistent across data collection points. These health outcomes included anemia, stroke, urinary tract disorders, kidney disorders, liver disease, and skin rashes. However, because of small numbers, for some time periods a change of one in the number of reports or in the sample size changed the level of statistical significance.

Workers report liver disorders, hearing loss, chemical poisoning

Hazardous Waste Worker Surveillance Project. Remediating hazardous waste sites is a critical national priority involving increasing numbers of workers. These workers are potentially exposed to high levels of complex mixtures of chemical contaminants, as well as to physical hazards. In 1993, ATSDR, in collaboration with the Laborers' Health and Safety Fund of North America, established a health interview surveillance system to follow prospectively a cohort of construction trade workers who had completed the initial training course for hazardous waste workers required by the Occupational Safety and Health Administration (OSHA). The surveillance project included workers trained at 18 centers nationwide. The purpose of the surveillance system was to administer baseline and annual follow-up health interviews to cohort members to detect trends and clusters of occupational illnesses and injuries that are caused by, or associated with, hazardous waste remediation work. Information will be used to guide intervention actions for disease and injury prevention.

The cohort of 5,583 workers was recruited during January 1, 1993, through April 12, 1996. This represents 89% of those workers who successfully completed the OSHA training course. By February 1997, 4,417 (79%) members of the cohort had completed the first annual follow-up interview.

In FY 1999, ATSDR prepared a report of the study results. The results of the baseline and first year follow-up interviews demonstrated that workers who performed hazardous waste work for at least 1 week during the follow-up period reported liver disorders, chemical poisoning, and hearing loss resulting from noise or accidents at work more than twice as often as cohort members who had not worked at a hazardous waste site during the follow-up period. Hazardous waste workers also had a nearly twofold increase in self-reported heat stress. ATSDR plans to further evaluate these health outcomes. The report was published in FY 2000.

Fish eaters had higher serum PCB levels

Housatonic River Area PCB Exposure Assessment Study. The Housatonic River and some areas nearby are contaminated with PCBs from a former electrical manufacturing facility in Pittsfield, Massachusetts. This study was undertaken by the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA), to characterize the extent and nature of PCB exposure opportunities among residents of the Housatonic River area. The study focused on an area that comprises eight communities in Berkshire County, Massachusetts: Lanesborough, Dalton, Pittsfield, Lee, Lenox, Stockbridge, Great Barrington, and Sheffield.

A total of 658 households, representing 1,529 people, participated in the exposure prevalence study. Of these 1,529 people, 120 were selected on the basis of an exposure risk scoring system. These 120 were asked to have their blood tested for PCBs, and 69 agreed to be tested. A total of 65 households, representing 158 individuals, participated in the volunteer study. All individuals 18 years old or over (126) were invited to take part in blood testing for PCBs, and 79 participated.

As observed in a number of studies previously conducted by MDPH and others, age was found to be the prominent predictor of serum PCB level. Considering all the potential exposure pathways examined, serum PCB levels tended to be higher in older people who were frequent and/or long-term fish eaters. In addition, other activities (e.g., fiddlehead fern consumption and gardening) may contribute slightly to serum PCB levels. People who reported potential occupational exposure had higher serum PCB levels than those who did not report this potential.

No differences detected between target and comparison groups

Chattanooga Creek Area Cross-Sectional Health Study, Chattanooga, Hamilton County, Tennessee. The Chattanooga Creek area is composed of the

Alton Park and Piney Woods communities of Chattanooga. The Chattanooga Creek empties into the Tennessee River, which is polluted with combined sewer overflows and industrial wastes. Portions of the creek bottom and flood plain are polluted with deep tar pits. Industries are intermixed with residential areas within these communities. Past air pollution and odors have been a major concern of area residents and environmental agencies for many years.

In 1995, the Tennessee Department of Health (TDH) conducted a health study comprised of target area and comparison area participants. Each participant was interviewed to ascertain the prevalence of health conditions and risk factors; gave urine and blood samples for analysis for biomarkers of kidney, liver, and immune/hematological system function; and participated in lung function tests.

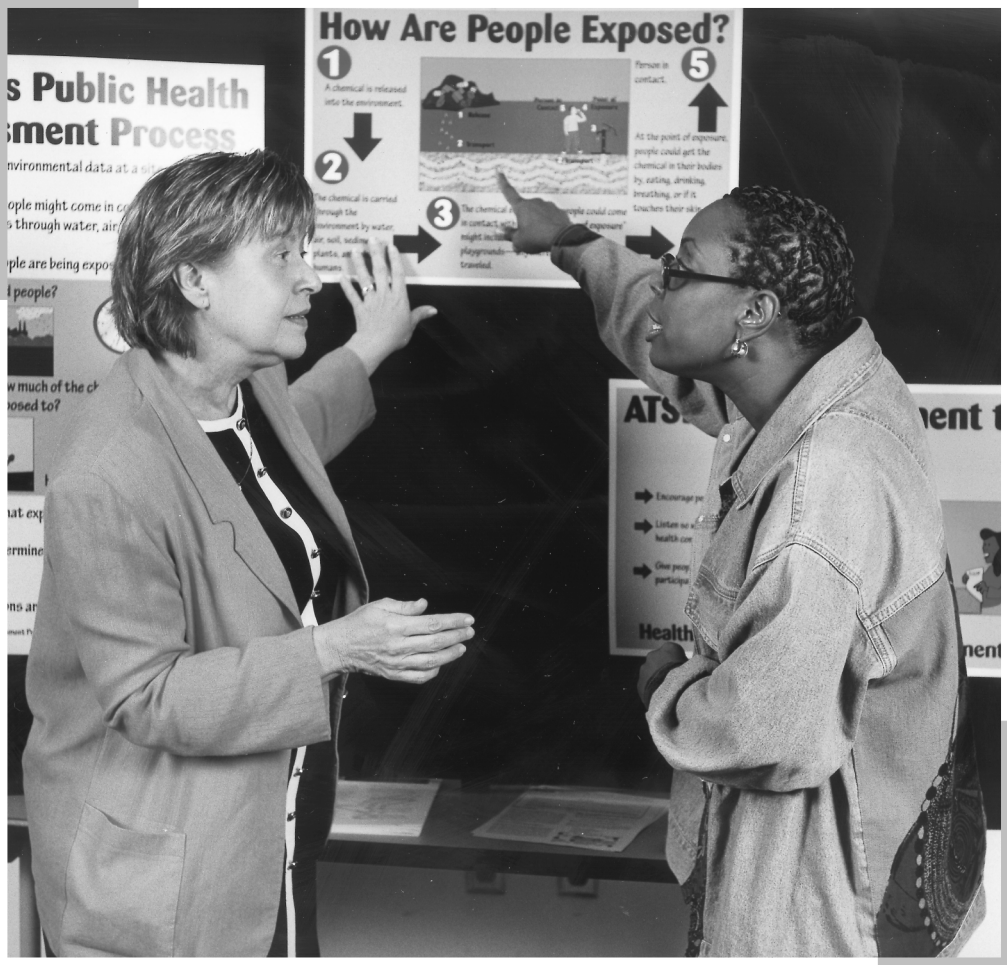
A report published in FY 1999 noted that no differences between target and comparison area participants were detected in self-reported symptoms, self-reported diseases, symptoms and diseases related to kidney dysfunction, symptoms and diseases related to liver dysfunction, reproductive outcomes, and pulmonary function, nor in biomarkers of kidney, liver, and immune/hematologic systems. The target area had a statistically significant increase in the number of people who reported that they were worried or concerned about environmental or chemicals hazards in the area.

HAZARDOUS SUBSTANCES EMERGENCY EVENTS SURVEILLANCE

Since 1990, ATSDR has maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences associated with the release of hazardous substances. During FY 1999, ATSDR published the HSEES report for 1998. The report summarized the characteristics of events reported to the 13 states that participated in the program in 1998.

The 13 states reported a total of 5,987 events for 1998. Approximately 79% of the events occurred at fixed facilities, and 21% were transportation-related. In 96% of the events, only a single substance was released. The most commonly reported categories of substances were volatile organic compounds; other inorganic substances; a category designated "other," which included substances that could not be placed in one of the other 10 categories; mixtures involving more than one category; ammonia; acids; and pesticides. During this reporting period, 405 events (approximately 7% of all reported events) resulted in a total of 1,533 victims. The most frequently reported injuries sustained by victims were respiratory irritation, eye irritation, skin irritation, gastrointestinal problems, and headache. A total of 36 persons died as a result of all events, and 520 events had an evacuation ordered.

The distribution of the types of events, the numbers of events with victims and evacuations, and the numbers and types of injuries reported have, overall, been consistent since HSEES inception.


How Are People Exposed?
1
A chemical is released into the environment.
2
3
5
Person in contact.
At the point of exposure, people could get the chemical in their bodies by eating, drinking, breathing, or if it touches their skin.
s Public Health
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CHAPTER FOUR: HEALTH EDUCATION AND PROMOTION

The Division of Health Education and Promotion (DHEP) offers a broad, in-depth foundation for health promotion, health education, environmental medicine, and risk communication activities through its four functional units: (1) Office of the Director, (2) Health Education Branch, (3) Health Promotion Branch, and (4) Communications and Research Branch. ATSDR, through DHEP, conducted or supported activities to achieve agency goals for health promotion, health education, risk communication, medical intervention, and capacity and partnership building.

ATSDR, in cooperation with its partners, performed health education and promotion activities at approximately 315 sites in FY 1999.

HEALTH EDUCATION ACTIVITIES

Health education activities were focused in three areas: (1) development of health education programs and materials for diverse populations; (2) implementation of a national strategy in environmental health training for nurses and other front-line health care providers; and (3) expansion of partnerships in environmental health expertise. The following are examples of these site-specific activities and programs.

Old Juncos Sanitary Landfill, Juncos, Puerto Rico

The 11-acre, Old Juncos Sanitary Landfill, an NPL site, contains municipal wastes and hazardous substances, including industrial thermometers. DHEP staff helped collect community data and prepare and distribute both English and Spanish-language fact sheets about the site's exposure pathways and the parameters of ATSDR's work at the site. The fact sheets were distributed to community members to inform them about the site and about steps they can take to protect themselves from exposure.

Kelly Air Force Base, Bexar County, Texas

ATSDR has been involved with the Kelly Air Force Base site since a 1996 petition was received from the late Senator Frank Tejeda to investigate potential health effects in neighborhoods north and southeast of Kelly. A public health assessment was conducted, and a multi-disciplinary team was organized to address the issues at the Kelly Air Force Base site. Working with the community and local health department, ATSDR conducted the following four training workshops in FY 1999 to strengthen collaboration efforts and increase knowledge of hazardous substances in the environment: (1) an 8-hour workshop for more than 100 nurses and college/university faculty; (2) a 2-hour grand rounds presentation for more than 80 health care professionals (e.g.,

physicians, public and private health care practitioners, and medical students) citywide; (3) a 4-hour workshop for 40 community members; and (4) a train-the-trainer workshop for faculty nurses from the San Antonio area. The workshops have helped foster greater cooperation and trust between the community, the local health department, and health care providers. Following these workshops, the community, local nurses, and the local health department have been collaborating to plan additional health interventions. The community and local health department are planning to hold a health fair that will provide health screenings and information for community members.

Los Alamos National Laboratory, New Mexico

The Rio Arriba Environmental Health Partnership is a community-based pilot project in northern New Mexico near the site of the Los Alamos National Laboratory. This partnership between a steering committee, the University of New Mexico Center for Population Health, the Centers for Disease Control and Prevention, and ATSDR provides training and information in environmental health. The partnership has fostered working relationships among the primarily Hispanic community members and external agencies. In FY 1999, ATSDR staff developed and presented an epidemiology short course for local community college students. The students are now involved in several environmental health projects within their communities and are recognized as a resource for environmental health information for northern New Mexico residents. Other environmental health courses are being developed.

Mississippi Delta Project

To address the environmental health needs of generally underserved communities in the Mississippi Delta region, ATSDR funded Howard University School of Nursing to develop a first-ever environmental health curriculum for nurses. The curriculum is to be used to train the trainers of nurses in the Delta region through local Historically Black Colleges and Universities and will be implemented in nursing schools nationwide. This curriculum was completed and released in FY 1999 to 220 schools of nursing in the Mississippi Delta Region. It has since received high interest nationally and internationally and has been reprinted twice. The National Library of Medicine is currently designing a Web site for the curriculum. Also, the University of Maryland and the Kellogg Foundation have developed a partnership to help implement the curriculum. In FY 2000, Howard University will evaluate the outreach and effectiveness of this curriculum effort.

Fish Consumption Guidelines

Through an interagency agreement with the EPA, DHEP initiated a national distribution of the fish consumption guidelines *Should I Eat the Fish I Catch?* in English, Spanish, and Hmong. Approximately 300,000 copies of the

guidelines (100,000 in each language) were printed and mailed to groups such as active members of the American College of Obstetrics and Gynecology, the American Academy of Pediatrics, and the American Academy of Family Physicians. These guidelines are intended to help physicians identify and counsel the susceptible populations they serve. The national distribution of the cover letter and brochures should provide the information needed to reduce exposures to possible contaminants found in noncommercial fish. As a result of this initiative, EPA and ATSDR are working together in FY 2000 to develop diagnosis and treatment guidelines for health care providers of patients who consume noncommercial fish.

STATE COOPERATIVE AGREEMENT PROGRAM

ATSDR provided funding and technical assistance for health education and other activities to 29 states through several cooperative agreements in FY 1999. Cooperative agreement recipients make a large contribution to ATSDR's health education services and to products for citizens living near hazardous waste sites throughout the United States. Fact sheets, brochures, fliers, training, and community education were provided to 255 sites by ATSDR and cooperative agreement states. Grand rounds, conferences, exhibits, public meetings, and school presentations were the venues to provide information to and encourage capacity building in often underserved communities. Examples of these activities follow.

Nine Mile Run, Allegheny County, Pennsylvania

Nine Mile Run is a 244-acre inactive slag disposal area. Environmental testing of the slag identified low levels of metals, including lead, manganese, validium, and iron. ATSDR and the Pennsylvania Department of Health became involved in the site at the request of EPA and in response to concerns from area residents. A health consultation addressing the human health effects of possible exposures to residents of the newly established community was begun in FY 1999. Education and awareness activities about the health consultation have resulted in an increased awareness of the need for dust suppression during grading and excavation at the site, worker safety, the air quality of surrounding areas, the handling of hazardous waste, and quality assurance and control of environmental data.

Activities have resulted in a multi-agency collaboration and the opening of a dialog with representatives of the Squirrel Hill Urban Coalition to discuss their health concerns and the conclusions and recommendations to be published in the health consultation. Also, the Pennsylvania Department of Health has received an invitation from the site developer to participate in meetings of the Public Task Force, which serves as a forum for the discussion and resolution of citizens' health concerns and other development-related issues.

Alabama Department of Public Health, Vincent, Alabama

The Alabama Department of Public Health, through a cooperative agreement with ATSDR, took a proactive approach to coordinate community involvement and health education at the Alabama Plating Company site in Vincent. The site had been contaminated with lead, and there was evidence that children were playing on the site. The Alabama Department of Public Health has conducted site visits, mail-outs to the community, a community survey, and public meetings to alert parents to the danger of childhood lead poisoning from this source. As a result, more than 90% of parents surveyed stated that they knew which areas were unsafe.

Wisconsin Environmental Health Department, Appleton, Wisconsin

In cooperation with other state and local agencies and organizations, the Wisconsin Environmental Health Department facilitated a seminar on the health concerns of eating fish for its Hmong population. The seminar addressed the areas of health concerns, fish identification and advisories, methods for preparing and cooking the fish, and the handling and preservation of fish. Hmong was the primary language spoken during the seminar.

HEALTH PROMOTION ACTIVITIES

Health promotion is the science and art of helping people change their lifestyles to move toward a state of optimal health. Optimal health is defined as a balance of physical, emotional, social, spiritual, and intellectual health. Lifestyle change can be facilitated through a combination of efforts to enhance awareness, change behavior, and create environments that support good public health practices.

ATSDR's health promotion program integrates health education, risk communication, environmental medicine, and promotional activities to assist communities affected by exposure to hazardous substances in the environment. The program supports three key goals—prevention, intervention, and capacity building.

In FY 1999, ATSDR conducted health promotion activities at the following sites: Agriculture Street Landfill, New Orleans, Louisiana; Alberton, Montana; Del Amo, Torrence, California; Grand Bois, Louisiana; Woolfolk Chemical Works, Fort Valley, Georgia; and Bunker Hill Superfund Site, Idaho. Following is an example of a site where ATSDR conducted promotion activities.

Agriculture Street Landfill, New Orleans, Louisiana

A significant effort to educate health care providers was initiated in the Agriculture Street Landfill (ASL) community in Louisiana. ASL is a 95-acre

former municipal landfill that was developed, in part, for residential use. To address the residents' health concerns, ATSDR distributed environmental health information to all 462 health care providers who serve the community. In addition, ATSDR provided a training seminar that 165 of these health care providers attended — a group who collectively serves more than 90 percent of the community. More than 300 community residents responded to an environmental health questionnaire. Clinical evaluations were conducted during September, October, and November 1999.

ATSDR also conducts a number of health promotion activities that are not site specific, but may be used at a number of sites, including developing case studies for training health care professionals and developing other educational materials.

Case Studies Developed for Health Care Professionals

The ATSDR series *Case Studies in Environmental Medicine* continues to be one of the most sought-after tools for training health care professionals who practice near communities affected by hazardous waste sites, attend undergraduate medical schools and residency programs, or take environmental courses at schools of public health. These documents are intended to increase the knowledge base of primary care providers with information about hazardous substances in the environment and to aid in their evaluation of potentially exposed individuals.

During FY 1999, a web-based interactive case study, *Immunological Disorders*, was developed for the agency by the Eastern Research Group and the American College of Medical Toxicology. This is the first interactive case study developed for the agency. The *Immunological Disorders* case study will be the highlight of a Web site developed exclusively for case studies. Two other new case studies were developed by the American College of Occupational and Environmental Medicine: *Children and Environmental Hazards* and *Environmental Asthma*. These case studies will be printed in limited numbers and also posted on the Internet.

Hazardous Substances and Public Health Newsletter

ATSDR's free, quarterly newsletter *Hazardous Substances and Public Health* (HSPH) is distributed in print and Internet versions. Its goal is to increase awareness and educate environmental and public health professionals and others about (1) the effects of hazardous substances on health, (2) means of preventing or mitigating exposure to hazardous substances, and (3) effectively communicating and using information about hazardous substances and environmental health. Almost 10,000 copies of each issue of the newsletter's printed version were distributed. The newsletter was also available on the Internet through ATSDR's Web site. The newsletter's presence on the Internet increases reader response, requests, and queries regarding general environmental health issues. In FY 1999, the home page for the electronic version of the newsletter was accessed approximately 69,116 times.

Spanish Translation

To better communicate with targeted audiences, ATSDR translates some documents into other languages. The following texts were translated into Spanish, or had their translations revised, in FY 1999:

- Translation of a generic fish advisory sign, for the Michigan Department of Community Health, to increase the knowledge of the fish consumption advisory among the Spanish-speaking population along the Pine River.
- Translation of *Ways to Protect Your Health* fact sheet. The fact sheet explains ways to prevent exposure to contaminated soil at the Vasquez Blvd. site in Denver, Colorado.
- Translation of several materials for the Juncos Landfill site, Ceiba Norte Ward, Juncos, Puerto Rico. These materials included the *Juncos Landfill* fact sheet and letters to residents and to the Mayor of Juncos.
- Translation of *What You Can Expect from ATSDR* and *Exposure* fact sheets.

HEALTH EDUCATION AND PROMOTION PARTNERSHIPS WITH NATIONAL ORGANIZATIONS

ATSDR's cooperative agreement program with five national organizations of health professionals conducted activities for the third and final year during FY 1999. The participating organizations included the American Association of Occupational Health Nurses (AAOHN), the Association of Occupational and Environmental Clinics (AOEC), the American College of Occupational and Environmental Medicine (ACOEM), the Association of State and Territorial Health Officials (ASTHO), and the National Association of County and City Health Officials (NACCHO). Partnerships with these national organizations augmented ATSDR's health education and promotion team with occupational and environmental medicine specialists, nurses, local environmental and health officials, and state health officials. The program's overall goal was to enhance, through collaborated efforts with a variety of health professionals, ATSDR's site-specific health education and promotion actions in communities nationwide.

In FY 1999, activities conducted by ATSDR's partners included the following:

- **AAOHN** conducted site-specific training for nurses in West Virginia and Texas, reaching more than 100 front-line professionals. AAOHN also assisted in developing ATSDR's Nursing Initiative, which is a national public health initiative intended to develop a national, integrated environmental health nursing strategy.
- **ACOEM** developed materials on women's environmental health and continued work on environmental medicine case studies on (1) evaluation of children exposed to hazardous substances, (2)

environmental respiratory illness, and (3) basic epidemiology and cancer clusters. These case studies will be widely distributed and used for medical education as monographs in ATSDR's series, *Case Studies in Environmental Medicine*.

- **AOEC** acted as a health education, health promotion, and medical consultation and referral resource for ATSDR staff and local health care providers at sites, including Alberton, Montana; Woolfolk Chemical Works, Fort Valley, Georgia; Del Amo/Montrose, Torrence, California; Agricultural Street Landfill, New Orleans, Louisiana; Grand Bois, Louisiana; Calcasieu/Mossville, Louisiana; and Bunker Hill Superfund Site, Idaho. AOEC also works closely with DHEP to establish pediatric environmental health specialty units in the 10 public health regions nationwide.
- **ASTHO** continued to provide environmental health information affecting environmental health practice at the state level. This information focused on child health issues and was disseminated through ASTHO's national electronic newsletter and electronic seminars. ASTHO also conducted four regional workshops on developing a medical monitoring program and a referral network for the Bunker Hill Superfund site, Idaho.
- **NACCHO** provided training to 20 local health agencies on how to conduct community environmental health education needs assessments; assisted the agencies in implementing community education and involvement activities at 14 Superfund sites and in six Brownfields communities; piloted a draft Brownfields Protocol at three sites; and developed a draft guidance document, *Community Revitalization: Identifying Roles, Improving Relationships — A Guidebook for Local Health Agencies*.

RISK COMMUNICATION AND RESEARCH ACTIVITIES

Prevention Effectiveness

Prevention effectiveness is the quantitative assessment of the expected impact of public health policies, programs, and practices on health outcomes. This type of analysis assists decision makers in identifying interventions that provide the greatest public health impact, while using limited resources.

In FY 1999 the program completed an assessment to estimate the impact of screening for selected health outcomes in a population exposed to lead at the Bunker Hill Superfund site, Idaho. The analysis provided ATSDR and other stakeholders with quantitative estimates of intervention outcomes, which were used to help select strategies to provide the greatest health benefit to the affected community. ATSDR also worked with the National Center for Environmental Assessment, EPA, to develop a comparative risk framework that applies prevention effectiveness to decision making about drinking water

treatment. The framework will assist decision makers at the local and federal levels to balance microbial and disinfection byproduct risks. In FY 1999, ATSDR, in collaboration with CDC's National Center for Environmental Health, developed and conducted two short courses on applying prevention effectiveness to a broad range of environmental health problems.

Psychological Effects Program

ATSDR's Psychological Effects Program is designed to prevent or mitigate adverse effects on psychological health that might occur as a result of living near a hazardous waste site or being exposed to a hazardous substance. In FY 1999, ATSDR expanded the program by partnering with EPA in the joint ATSDR and EPA psychological effects initiative. Through this initiative, ATSDR provides training to EPA field personnel on how to recognize causes of psychosocial stress in communities near hazardous waste sites and actions they can take to ameliorate the stress. In addition, a pilot site was chosen for a joint ATSDR and EPA effort in mitigating psychosocial stress by utilizing the skills of social workers to provide a community with practical support during a relocation resulting from environmental contamination.

In FY 1999 the *Report of the Expert Panel Workshop on the Psychological Responses to Hazardous Substances* was published. This publication continues to be distributed.

PEDIATRIC ENVIRONMENTAL HEALTH SPECIALTY UNITS

In 1998, AOEC and ATSDR developed the Pediatric Environmental Health Specialty Unit Program as a national resource for pediatricians, other health care providers, federal staff, and the public to (1) reduce environmental health threats to children, (2) improve access to expertise in pediatric environmental medicine, and (3) strengthen public health prevention capacity. The key focus areas of the units are medical education and training, telephone consultation, and clinical specialty referral for children who may have been exposed to environmental hazards.

For example, the Pediatric Environmental Health Specialty Unit at Harborview Medical Center in Seattle, one of the first units established, receives about 2,000 calls a month. Callers' concerns have included the consumption of well water contaminated with pesticides, a number of elemental mercury exposures, and solvent exposures from painting a child's bedroom. Health care providers specifically trained in both pediatrics and environmental medicine are available on a case-by-case basis to see children and their families. Additionally, the PEHSU at Harborview provides training for health care providers and the public on childhood environmental health issues.

Three units opened in FY 1998, and one more began operating in FY 1999. In addition, a fifth unit—the Southeast Pediatric Environmental Health Specialty Unit—was being planned at Emory University in Atlanta in FY 1999. The four units that were operating in FY 1999 are as follows:

- **Pediatric Environmental Health Center, Children's Hospital, Boston, Massachusetts**, established in 1998, is a regional center for pediatric environmental health, with support from ATSDR and AOEC. The center is a joint program of Children's Hospital in Boston, the Occupational and Environmental Health Program at Cambridge Hospital, Harvard Medical School, and the Occupational and Environmental Medicine Program, Harvard School of Public Health.
- **Mt. Sinai Pediatric Environmental Health Unit, Mt. Sinai-Irving J. Selikoff Center for Occupational and Environmental Medicine, New York, New York**, was established in 1998 as a regional center for pediatric environmental health, with support from ATSDR; the National Center for Environmental Health, CDC; and the American College of Preventive Medicine.
- **The Center for Children's Environmental Health, Cook County Hospital, Chicago, Illinois,** established in 1999, is a regional center for pediatric environmental health, with support from ATSDR, EPA, and AOEC. The center is a joint program of the Division of Occupational and Environmental Medicine and the Department of Pediatrics at Cook County Hospital. It is affiliated with the Great Lakes Center for Occupational and Environmental Safety and Health at the University of Illinois and Chicago's Toxikon Consortium. It works closely with the Illinois Poison Control Center; local, state, and federal environmental and public health agencies; and local health care institutions.
- **Pediatric Environmental Health Specialty Unit, Harborview Medical Center, Seattle, Washington,** was established in 1998 by the University of Washington Occupational and Environmental Medicine Program, the Washington Poison Center, and Children's Hospital and Regional Medical Center. The unit serves as a regional center for pediatric environmental health, with support from ATSDR, EPA, and AOEC.

APPENDIX A: SITES AT WHICH ATSDR CONDUCTED ACTIVITIES IN FY 1999

The following list shows the sites at which ATSDR conducted public health activities in FY 1999, specifically public health assessments, health consultations, health education and promotion, health studies, and emergency response. Consultations that are not site specific are not listed. The listing uses these abbreviations:

HA = public health assessment
HC = health consultation
HE = health education
HS = health study
EI = exposure investigation
ER = emergency response

Alabama

Alabama Plating Co. Inc.	HC (2), HE
Anniston Army Depot (SE Ind. Area)	HA
American Brass	HE
Boaz City Landfill	HC
Hartzog Farm	HC
Huntsville Mercury Spill	ER
Knollwood Community	EI, HE
Monsanto Company	HE
Redwing Carriers, Inc. (Saraland)	HC (2)
Riverside Chemical/Terra Int.	HC

Alaska

Alaska Pulp Corp.	HA
Alice White Communication School Facility	HC
Arctic Surplus	HA
Fort Wainwright	HC
U.S. Army Fort Greely	HC

Arizona

American Express	HE
Choulic Gravel Pit	HC
Goodyear Airport	HE
Grand Way Cleaners	HC
Klondyke Tailings	HA, HE
Luke AFB	HE
Motoral 52nd Street	HE
North Indian Bend Wash	HE
Saceton Tire Fire	ER
South Indian Bend Wash	HE
Tucson International Airport Area	HA, HE
Vulcan Fire	HE
Vulture Mill	HE
Williams AFB	HE
Wrecksperts	HC

Arkansas

Agri-Tuff Fire	ER
Arkansas Methyl Parathion Sites	HC
Gurley Pit	HE
Hadco of Arkansas Inc.	HC
Helena Chemical	HE
Koppers Industries	HE
Pine Bluff Arsenal	HE
R & P Electroplating	HC (2)
Saline River Basin-Mercury Issue	HE
Texarkana Mercury Spill	HE
Vertac, Inc.	HC (2)

California

Aerojet General Corp.	HE
Arroyo Pasajero	HE
Barstow Marine Corps Logistics Base	HA
Castle Air Force Base	HA
Chrome Crankshaft/Suva School	HE
Del Amo	EI, HC, HE
George Air Force Base	HA
Jet Propulsion Laboratory (NASA)	HA
Koppers Co., Inc. (Oroville Plant)	HA
Lava Cap Mine	HA, HE
Lawrence Berkeley Laboratory	HC
Lawrence Livermore Laboratory (U.S. DOE)	HC (2), HE
Lockheed Propulsion Co.	HC
Lehr/Old Campus Landfill (U.S. DOE)	HC
McMinn State Superfund Site	HC, HE
Moffett Naval Air Station	HA
Molycorp	HE
Montrose	HE
New River	HC, HE
Omega Chemical Corporation	HA
Orland Cleaners	HC
Pacific Gas & Electric	HA, HE
Pemaco Maywood	HA, HE
Ralph Grey Trucking Site	HS
Richmond Refinery fire	ER
Rocketdyne	HE

San Diego Release	ER
Sherwin Williams	HA
Temecula Mercury Ingestion	ER
Torrance Aldehyde Fire	ER
Torrance Industrial Cleaner Spill	ER
Torrance Pesticide Spill	ER
Torrance Phosgene Release	ER
Union Pacific	HA
Vernon Chemical Mixtures Spill	ER
Waste Disposal Inc.	HE

Colorado

ASARCO Globe Plant	HE
Denver Radium Site	HC, HE
Leadville	HE
Lincoln Park	HE
Lowry Air Force Base	HC
Summitville Mine	HE
Vail Water Contamination	ER

Connecticut

Barkhamsted-New Hartford Landfill	HE
Batchelder Site	HE
Bristol Sanitary Landfill	HC
Buell Greenhouse	HE
Danbury Landfill	HE
Durham Meadows	HC
Former Clock Factories	HA, HE
Linemaster Switch Corp.	HC
Old Southington Landfill	HC
Raymark Industries	HE
Remington Park	HC (2), HE
Solvents Recovery Services of New England	HE
South Pine Creek Road	HE
Timex Corp.	HC (2), HE
Torrington Co.	HE
Upjohn Co. Fine Chemicals Division	HA
Yaworski Dump	HA

Florida

Bradenton	HE
Brown's Dump	HA,HE
Continental Turpentine & Resin	HC
Doeboy Dump	HC
Eastwood Golf Course	HA
5th & Cleveland Incinerator Site	HC
Fort Pierce Warehouse Fire	ER
Florida Reptile Tannery	HC
Florida Petroleum Reprocessors	HA,HC
Gulfcoast Recycling	HE
Head Start Preschool Tropicana	HE
Holiday Utilities	HC
Jernigan Trucking Dump	HC
Kar Printing, Inc.	HC
Landia Chemical Co.	HA, HE
Lonnie C. Miller, Sr. Park	HC
Melrose Lead Site	HC
Normandy Park Apartments	HA, HE
People's Gas/Florida Suncoast Dome	HC
Post & Lumber Preserving Co. Inc.	HC
Sanford Gas Plant	HE
Solitron Microwave	HA, HE
Stauffer Chemical Co. (Tarpon Springs)	HA, HC(2), HE
Sunland Gardens Condominium/ Brookside	HC(2)
Town & Country Lake Estates	HC
Wingate Road Municipal Incinerator Dump	HC (2), HE
Wryals Pit	HE

Georgia

American Thread Fire	ER
Austral Insulated Products	HC
Brunswick Wood Preserving	HA, HE
Camilla Wood Preserving Company	HA
Clarke Road Municipal Solid Waste Landfill	HA
Clayton County Medical Waste	ER
Coastal Plain Treating Co.	HC
Griffith Oil Company	HA
Koppers Court Release	HC
Lakewood Battery	HC
Marzone Inc./Chevron Chemical Co.	HC
Monsanto, Augusta	HE
Old Douglas County Landfill	HA
Parramore Fertilizer	HC
R. M. Clayton Sewage Treatment	HA
Richmond County	HE
Robins Air Force Base (Landfill#4/Sludge Lagoon	HA
T.H. Agriculture & Nutrition (Albany)	HA
Terry Creek Dredge Spoil Areas/ Hercules Outfall	HA
Tifton Petitioned Sites	HC
Tri-State Steel Drum Co. Inc.	HA
Turtle River, Glenn County	HS
Woolfolk Chemical Works, Inc.	HC

Hawaii

Farmers' Mutual Cooperative	HA
Honolulu Skeet Club	HC
Naval Computer & Telecommunications Area	HA
Naval Radio Transmitter Facility Laulualei	HA

Idaho

Blackbird Mine	HE
Bunker Hill	HE
Coeur d'Alene	HE
Eastern Michaud Flats Contamination	HC (3), HE
Mountain Home Air Force Base	HA
Soda Springs Industrial Sites	EI

Illinois

Adams County Quincy Landfills 2&3	HA
Altgeld Gardens	HC (2)
Amoco Chemical Landfill	HE

Argonne National Labs	HE
Barrie Park Former Manufact. Gas Plant	HC, HE
Byron Salvage Yard	HA
Celotex Corporation	HC
Chanute AFB	HE
Chicago Metro Methyl Parathion Site	HE
Chicago Explosion	ER
Crab Orchard	HE
DuPage County Landfill/ Blackwell Forest	HE
East Peoria Cleaners	HC
East St. Louis	HE
Essex Group Inc.	HC
Estech General Chemical Co.	HC, HE
Evergreen Manor	HA, HE
Hartz Construction	HC
H.O.D. Landfill	HC
Illinois Beach State Park	HE
Indian Acres	HE
Indian Refinery-TexacoLawrenceville	HA
Jennison-Wright Corporation	HA, HE
Kaney Transportation	HA
Lake Landfill/Effingham	HC (2)
Lanson Chemical/Purex Corp.	HA
Lasalle Electric Utilities	HC, HE
Lawrenceville Refinery	HE
Matthiessen and Hegeler Zinc Company	HA
Meth Labs	HE
Methyl Parathion	HE
Midwest Body Corporation	HC
MIG/Dewane Landfill	HC, HE
New Jersey Zinc/Mobil Chemical	HE
New Windsor Battery Plant fire	ER
NL Industries/Taracorp Lead Smelter	HA
Parsons Casket Hardware Co.	HA
Pfizer Inc.	HE
Precision Chrome, Inc.	HC
Prior Landfill	HE
Pullman Factory	HC
Sandoval Zinc Co.	HA
Sangamo Electric/Crab Orchard Nwr (U.S. DOI)	HA
Savannah Army Depot Activity	HA
Seymour of Sycamore Inc.	HC
Smith Douglas, Inc.	HE
South California Chemical	HC
Waste Hauling	HC
Wasteland Landfill	HC
West Pullman Iron & Metal	HA
Yeoman Creek	HE

Indiana

A.O. Smith	HE
Avanti Corporation	HC
Brazil Warehouse Fire	ER
Cam-Or Inc.	HA
Conrail Tank Car Release	ER
East Chicago	HE
Gary City Landfill	HC
Himco Dump	HA
Illinois Central Spring	HC
Keil Chemical	HE
Meridian Road Dump	HC, HE
Miami County	HE
M. Metal Company Incorporated	HC
Ninth Avenue Dump	HC
Shelly Ditch	HC
Vickers Warehouse Site	HA

Iowa

Albert City SBA - Lots	HC, HE
Blenco Train Derailment	ER
Casey's General Store	HE
Cedar Grain Bin	HC, HE
Clinton Coal and Gas	HE
Economy Products	HE
Farmers Mutual Cooperative	HA
Iowa Army Ammunition Plant	HA
Iowa City FMG	HE
General Motors Landfill	HE
McGraw Edison Site	HC
Nahant Marsh	HE

Kansas

Ash Grove Cement	HC
Heartland Cement	HC
Lafarge/systech Fredonia	HC
Laidlaw Environmental SVS Aragonite, Inc.	HC

Kentucky

Ashland Petroleum Company	HC
Paducah Gaseous Diffusion Plant (DOE)	HA

Louisiana

Agriculture St. Landfill	HA, HC (3), HE
Anderson Island	HE
Arabi Mercury Spill	ER
Calcasieu Estuary	HC (3), EI, HE
Delatte Metals	HA
Grand Bois Area	HC (2), HE
Gulf State Utilities-North Ryan Street	HA
International Paper Co. Springhill Mill	HC
Lincoln Creosote	HA, HE
Madisonville Creosote Works	HA
Methyl Parathion	HE
Morgan City Sulfur Fire	ER
Oak Harbor Golf Club	HC
Petro-Processors	HE
Southern Shipbuilding	HA
Texaco Inc. Shreveport Works	HC
Thompson-Hayward Chemical Company	HC

Maine

Loring Air Force Base	HA
West Site/Hows Corners	HC

Maryland

Beltsville Agricultural Research (USDA)	HA
Fort George G. Meade	HA
Hagerstown Mercury Spill	ER
Patuxent River Naval Air Station	HC
Springfield Foundry Explosion	ER

Massachusetts

Ark-Les Site	HE
Atlas Tack Corp	HE
Baird & McGuire	HE
Bogs Landing	HE
Churchill Shores	HE
Deerfield River Valley	HE
Dow Chemical	HE
Fisherville Mill Fire, Grafton	ER
Fort Devens	HA, HC (2)
GAF Building Materials Corp.	HA
General Electric Housatonic River	HE, HS
Hercules Chemical (Former)	HC
Industri-Plex	HE
Jamesbury Corp	HC
Merrimack Valley	HE
Morse Cutting Tools	HA
Natick Laboratory Army Research, D&E Cntr	HC, HE
Nyanza Chemical Waste	HE
Old Bondsville Factory	HC
Re-Solve, Inc.	HA
Somerset Mall	ER
South Weymouth Naval Air Station	HA, HE
Toke-Renbe Farm	HE
Wells G and H, Woburn	HE

Michigan

Allen Park Clay Mines	HE
Allied Paper/Portage Creek/ Kalamazoo River	HE
Bendix Corp./Allied Automobile	HE
Brownfields	HE
Cadillac Tar	HE
Davis Wash King	HC
Harbor Plating Works	HC
Jaco Plating	HC
Lafarge Corporation-Alpena Plant	HA, HE
Lake Tar	HE
MCI, Inc.	HC
Silvertone Plating Company	HC
Sturgis Municipal Wells	HE
Velsicol Chemical Michigan	HE
West Beitz Creek Fill Area	HA

Minnesota

ADM/IFC Methyl Bromide Exposure	HC, HE
Ashland Petroleum Company	HC, HE
Blaine Municipal Wells	HC, HE
Capitol Child Care Center	HE
Captain Dodd Landfill	HE
CMC Heartland Partners Lite Yard Site	HC, HE
Duluth Harbor Drum Site	HE
Faribault Municipal Well Field	HC, HE
Fergus Falls Sanitary Landfill	HE
Former Dakota County/Nike Airbase	HE
Former Minneapolis Gasworks	HE
Fridley Commons Naval Industrial Reserve Park Well Field	HA
Georgia Pacific Bemijdi	HE
Georgia Pacific Hardboard Plant	HE
Hackensack Gasworks	HE
Interplastics	HE
Kummer Sanitary Landfill	HC
Minneapolis House	HE
Myrtle Street Dump	HE
Naval Industrial Reserve Ordinance Plant	HA, HE
New Brighton/Arden Hills/TCAAP	HE
Northern Engraving Corporation	HC
Ordnance Plant	HA
Paynesville Municipal Wells	HC
Perham Arsenic Site	HC, HE
Pig's Eye Landfill	HE
Southern Minnesota Beet Sugar Coop	HC, HE
Spring Grove Municipal Well Field	HE
St. Louis River/ US Steel	HE
St. Paul Park Groundwater Contamination	HC
Stillwater City Dump	HE
Superwood Corporation Nuply Division	HC
Windom Dump	HC, HE

Mississippi

Mayfair/New Haven Subdivision	HA

Missouri

Amoco Oil Co.	HA
Armour Road	HA
Big River Mine Tailings/ St. Joe Minerals	HC, HE
Bonne Terre Mine Tailings	HC (2), HE
Chillicothe Manufactured Gas Plant	HC
Defiance Dump Sites	HC
Elvins Mine Tailings	HC, HE
Federal Tailings Pile	HC
Highway AF Wells	HC
Kansas City Home Mercury Spill	ER
Leadwood Mine Tailings	HC
Lebanon Tank Truck Release of Nitric Acid	ER
Madison County Mine Tailings	HE
Missouri Electric Works	HC (5), HE
National Mine Tailings	HC, HE
Newton County Mine Tailings	HE

Newton County Wells	HA,HC
Pools Prairie	HA, HE
Quality Products	HE
S & S Landfill	HC
Times Beach	HS
Valley Park TCE	HE
Wheeling Disposal Service Co.Landfill	HA

Nebraska

Bancroft Homes	HC

New Hampshire

A. C. Lawrence Leather	HC
Beede Waste Oil	HC, HE
Grugnale Waste Disposal	HE
Johns Manville/Nashua River	HE
Messer Street Manufactured Gas Plant	HE
Pease Air Force Base	HA, HE
Surrette America Battery	HC

New Jersey

Atlantic State Cast Iron Pipe	HA
Ciba-Geigy Corp.	HE
Cornell Dubilier Electronics Inc.	HC (2)
De Rewal Chemical Co.	HE
Dover Township Landfill	HA, HE
Dover Township Public Water Supply	HE
Federal Creosote	HA, HC
Fort Dix (Landfill Site)	HA
Franklin Burn	HA, HE
Grand Street Mercury	HA, HE
Hilliards Creek Site	HC
Horseshoe Road	HC
Hunterdon	HE
Imperial Oil Co., Inc./Champion Chemicals	HC, HE
Kin-Buc Landfill	HC
LCP Chemicals Inc.	HA
Middlesex Water Company	HC
Myers Property	HE
Pavilion Avenue Field	HC
Picatinny Arsenal (U.S. Army)	HC
Pomona Oaks Residential Wells	HC
Radiation Sites: US Radium, Montclair, Camden	HE, HS
Reich Farms	HA, HE
Roebling Steel Co.	HC
Route 561 Dump	HA
Silverton Wells	HA
Somerset	HE
Sussex	HE
Swope Oil & Chemical Co.	HC
Toms River General Post Office	HC
United States Avenue Burn	HA
Warren	HE
Zschiegner Refining	HA, HE

New Mexico

North Railroad Avenue Plume	HA
Rinchem Co., Inc.	HA
Stephenson – Bennett Mine	HC

New York

Anitec Image Corp	HA,HE
Akzo Salt Mine	HE
Al Turi Landfill	HE
American Thermostat	HE
APCO/Woodstock Brownfield	HE
Batavia Landfill	HC
Blydenburg/Islip Landfill	HE
Brookfield Avenue Landfill	HA, HE
Brookhaven National Laboratory	HE
Broome County	HS
Cadiz	HE
Circuitron	HE
Colesville Municipal Landfill	HE
Computer Circuits	HA
Cortese Landfill	HE
Cross Country Sanitation	HE
Drycleaners	HE
Forest Glen	HE
Fresh Kills Landfill	HC (2), HS
Fulton Avenue	HE
GCL Tie & Treating Inc.	HA,HE
General Motors Central Foundry Division	HA, HE
Goldsic	HE
Griffiss Air Force Base	HE
Hertel Landfill	HC, HE
Hillcrest Cancer Cluster	HE
Hiteman Leather	HA
Holtsville	HE
Hudson River	HE
Huntington Landfill	HE
Jones Sanitation	HE
Jones Chemical	HE
Lehigh Valley Railroad	HA, HE
Little Valley	HA
LI Tungsten Corp.	HC, HE
Liberty Industrial	HE
Metro Gas Station	HA, HE
Mohonk Road Industrial Plant	HA, HE
Nepera Chemical	HE
Niagara County Refuse	HE
Nike Missile Base	HE
Olean Wellfield	HE
102nd Street Landfill	HE
Onondaga Lake	HE
Pellham Bay Landfill	HE
Peter Cooper Landfill	HE
Plattsburgh Air Force Base	HE
Roscoe Wood Products	HC
Rowe Industries Groundwater	HA
Seneca Army Depot	HA, HE
Seneca Landfill Fire	ER
Sidney Landfill	HE
Sinclair Refinery	HE
Smithtown Groundwater	HA, HE
St. Regis Mohawk Reservation	HC
Stanton Cleaners	HE
Underground Storage Tanks	HA

Village of Liberty Wells	HE
Wide Beach	HE

North Carolina

Davis Park Road TCE	HA
Mecklenburg Chemical Release	ER
Trinity of America Corp.	HC
V.C. Chemical - Almont Works	HC

Ohio

Armentrout Excavating	HC
Black River Middle School	HE
Bolin Oil	HC
Carriage Park	HC
Chemical Recovery	HC
Columbus Mercury Release	ER
Eagle Picher	HC (4), HE
Industrial Excess Landfill	HC (2), HE
Lammars Barrel	HE
Lewisburg Drum Site	HC (2)
Marion County	HC
Mead Fine Paper Division	HC
Nease Chemical	HE
North Sanitary Landfill	HC (2), HE
Nylonge Corp	EI, HC
Penn-Michigan	HE
RMI Metal Fire	ER
Stickney Avenue Landfill	HE
Sycamore Tire Fire	ER
Toledo Tie Treatment Plant	HC (3), HE
TRW–Minerva	HE
Waste Technologies Industries	HC
Wright-Patterson Air Force Base	HA
XXKem (SACM Site)	HE

Oklahoma

Hudson Refinery	HV
Tar Creek	HE
Tulsa Fuel and Manufacturing	HA

Oregon

Oregon State Penitentiary	HC
Portland Mercury Release	ER

Pennsylvania

Amalie Refinery	HC
Boyertown Scrap	HE
Callery Chemical Assessment	HA
Derewal Property	HC
Drake Chemical	HC
Fischer & Porter Co.	HC, HE
Gulf Oil Sinking Springs	HC
Havertown PCP	HC
Hazleton	HE
Huntsdale Fish Hatchery	HE
Jacks Creek	HE
Jackson Ceramix Inc.	HC
Keystone Resources	HC
Keystone Sanitation Landfill	HC, HE
Marjol Operation	HC, HE
Marvel Point Development	HE
New Castle Development Corp. Site	HC
Nine Mile Run Slag Area	HC (3), HE
North Penn - Area 8	HC
Penn Central Trans. Co.	HC
Perry Phillips Landfill	HC
Port Allegany Chemical Works	HC
Portland Mills derailment	ER
Precision National Corp.	HC (6), HE
Royal Green Metal Recyclers Emergency	HC
Salford Quarry	HA
Sharon Steel Corp (Farrell Wks Disp Area)	HA
St. Mary's Borough Landfill	HC
Tollbrothers – Saba	HC
Tri County Industries Inc.	HC, HE
Warwick Township	HC, HE
Valley Forge National Historic Park	HC (3)

Puerto Rico

V&M/Albaladejo	HA
Vega Baja Solid Waste Disposal	HA
Union Carbide Grafito	HC

Rhode Island

Centredale Manor Restoration	HC
Hometown Properties	HC
Newport Naval Education/ Training Center	HC
North Smithfield Sites	HC
Smithfield Chemical Industrial Dump	HA

South Carolina

Aiken Tire Fire	ER
ARA	HE
Bear Site	HC, HE
Big Creek Landfill	HC, HE
Calhoun Park Area	HE
Cherokee County Landfill	HC (2)
Conbraco-South Arant Road	HC
Helena Chemical Co.	HE
Hollis Road Private Well	HE
Hucks County Express	HE
International Minerals and Chemicals	HC
Kellett Property	HE
Koppers Co., Inc., Charleston	HC, HE
Lexington County Landfill	HE
Palmetto Landfill	HC
Sangamo Weston/Twelve-Mile Creek	HE
Sarratt Property	HC
Savannah River Site (U.S. DOE)	HC
Shuron Inc.	HA, HE
U.S. Steel-Agrichem	HE

South Dakota

Black Hills Ordnance Depot	HC

Tennessee

American Bemberg Plant	HA

Chattanooga Creek	HS
College Grove Battery Chip Site	EI
General Smelting & Refinery	HC
H.O. Forgy & Son Inc.	HC (2)
Jersey Miniere Zinc Co.	HA,HC
Mallory Capacitor Co.	HC
Ross Metals Inc.	EI, HA
Tennessee River	HC
Warren County High School	ER

Texas

Alcoa (Comfort Point) Lavaca Bay	HE
Austin, Holly St. Power	HA
City of Perryton Well No. 2	HA
East Texas Lake	HE
El Paso Plating Works	HC
Electro Plating - El Paso	HC
El Paso-Multiple Sclerosis	HE
Garland Creosoting	HE
Hart Creosoting	HE
Hu-Mar Chemical Corporation	HC
Jasper Creosoting Company Inc.	HA
Kelly Air Force Base	HA, HE
Lone Star Army Ammunition Plant	HA
Longhorn Army Ammunition Plant	HA
Many Diversified Interests, Inc.	HA, HC (2)
MDI/Tesco	HE
Perryton Wells	HE
Rockwool Industries Inc.	HA
Rockwall Mercury Spill	ER
Sprague Road Ground Water Plume	HA
Star Lake Canal	HE
State Marine of Port Arthur	HA
State Highway 114 Groundwater Plume	HC

Utah

Clandestine Drug Production Labs	HE
Cross Hollow Hills Drinking Water System	HC
Former Miller Floral Site	HC, HE
Jacobs Smelter Site	HC, HE
Sentinel Surveillance System Project	HC
Staker Paving Asphalt Production Plant	HC
Steel Creek	HE
Tooele Army Depot (North Area)	HC

Vermont

Lakeside Community Sites	HC
Pownal Tannery	HA

Virgin Islands

Bovoni Dump	EI

Virginia

Cobbdale Area Site	HC
Greenwood Chemical Co.	HA
Fairgrounds Road Site	HC
Langley Air Force Base/ NASA Langley Center	HA
Manassas Autodump Fire	ER
Norfolk Naval Base (Sewells Point Naval Complex)	HC
Oldover Corp	HA (3)
U.S. Titanium	HA
USAF Langley AFB	HA

Washington

Able Pest Control	HC
Applicare, Inc. fire	ER
Bangor Naval Base	HE
Beser Co.	HE
Boomsnub/Airco	HA
Burlington Northern	HC (2), HE
CENEX- Quincy	HE
Champion Int. Corp/ Klickitat Lumbermill	HC
Chemical Contamination	HE
Fairchild Air Force Base (Four Waste Areas)	HC
Hamilton Road PCE	HC
Hanford	HS
Interstate Coatings	HC
Kitsap Co. - Bainbridge Is. Dump	HC (5)
Moses Lake Wellfield	HC, HE
Northport Area	HA
Oeser Co	HA,HC
Palermo Well Field Groundwater	HC
Pasco Sanitary Landfill	HC
Sisco Landfill	HC
Spur Industries	HC (2)
Sylvan Way Land Co. Sand Pit	HC
Western Farmers, Inc.	HE
WSU Long Beach Research & Extension Unit	HC

West Virginia

Charleston Tank Truck Accident	ER
Hanlin-Allied-Olin	HA
Heizer Creek	HC
Huntington	HE
Kanawha Motive Power	HC
Nitro	HE
Spelter Zinc Plant	HC
Valley Chemical and Fertilizer	HC

Wisconsin

Ashland Coal and Gas	HE
Betz, Robert G. Property (Estate Of)	HC (2)
Brownfields	HE
Cargill	HC
Doberstein Lumber & Fence	HC
Eau Claire Wastewater Treatment Plant Outfall (Former)	HC
Fox River NRDA/PCBs	HA, HE
Getzen Co. Inc.	HC
Hawthorne Melody	HC
Luxco	HC
Marina Cliffs Barrel Dump	HC,HE
Moss-American (Kerr-McGee Oil Co.)	HC

Miller Compressing Company, Inc.	HC
Penta Wood Products	HC
Rueping Leather Company	HC
Scott Elementary School Carbon Monoxide Leak	ER
U.S. Army Badger Ammunition Plant	HA
West Bend Plating	HC
Wheeler Pit	HC

Wyoming

North Casper PCE Plume	HC
F.E. Warren Air Force Base	HA

APPENDIX B: TOXICOLOGICAL PROFILES PREPARED IN FY 1999

Final
Aluminum (Update)
Cadmium (Update)
Chlorinated dibenzo-p-dioxins (Update)
Chloroethane (Update)
Chloromethane (Update)
Chlorophenols (Update)
1,4-Dichlorobenzene (Update)"
3,3-Dichlorobenzidine (Update)
2,4-Dinitrotoluene and 2,6-Dinitrotoluene (Update)
Ethylbenzene (Update)
Formaldehyde
Hexachlorocyclohexane (Update)
Hexachlorocyclopentadiene
Hexane
Hydrogen sulfide
Lead (Update)
Mercury (Update)
Phenol (Update)
Sulfur dioxide
Sulfur trioxide/sulfuric acid

Public Comment Draft
Arsenic
Chromium
Endosulfan
Ethion
Manganese
Methylene chloride
Polychlorinated biphenyls
Toluene

Under Development
Asbestos (Update)
Benzidine (Update)
1,2-Dichloroethane (Update)
DDT, DDE, and DDD (Update)
Di-n-butyl phthalate (Update)
Methyl parathion (Update)
Pentachlorophenol (Update)
Perchlorates

U.S. Department of Defense

Final Toxicological Profiles
2-Butoxyethanol and 2-Butoxyethanol acetate
Di-isopropyl methylphosphonate
Hexamethylene di-isocyanate
Jet fuels (JP-5) and (JP-8)
Methylenedianiline

Public Comment Draft
Total Petroleum Hydrocarbons

U.S. Department of Energy

Public Comment Draft
Uranium (Update)
Ionizing Radiation

APPENDIX C:
ATSDR RESOURCES ON THE INTERNET

ATSDR has many documents on its Internet site that provide information about specific sites, substances, agency programs, and activities. These include full public health assessments for a number of sites, easy-to-read fact sheets on toxic substances (ToxFAQs), and case studies for health care professionals. ATSDR's Internet address is:

www.atsdr.cdc.gov

Some of the resources available on the web site are listed below.

1999 CERCLA Priority List of Hazardous Substances
A Primer on Health Risk Communication Principles and Practices
An Evaluation Primer on Health Risk Communication Programs and Outcomes
ATSDR Cancer Policy Framework
ATSDR National Alerts–Toxic Substances
ATSDR Public Health Advisories
ATSDR Public Health Assessments
ATSDR Science Corner
ATSDR Statement of Values
ATSDR's Most Frequently Asked Questions
Case Studies in Environmental Medicine
Community Involvement Pages
Community Matters: About ATSDR
Community Matters: Exposure
Community Matters: Find Out About Sites in Your Community
Community Matters: Information for Communities
Community Matters: Resources and Contacts
Community Matters: Search for a Specific Chemical
Community Matters: The ATSDR Ombudsman
Community Matters: What You Can Expect from ATSDR
Congressional Testimony: Medical Monitoring at Hanford Nuclear Facility
Congressional Testimony: The Scientific Aspects of Mercury
Croatia
Dioxin and Dioxin-Like Compounds in the Soil, Part 1, ATSDR Interim Policy Guideline
Draft Agenda for Public Health Activities for Fiscal Years 1999-2000 at U.S. Department of Energy Sites
Great Lakes Human Health Effects Research Program
Hazardous Substances and Public Health Newsletter
Hazardous Substances Emergency Events Surveillance (HSEES) Annual Report 1997
HazDat Site Activity Query Map
Methyl Parathion Expert Panel Report
Mississippi Delta Project
Organizational Chart of ATSDR
Public Health Concerns at Department of Energy Sites
Public Health Implications of Dioxins
Public Health Implications of Exposure to Polychlorinated Biphenyls (PCBs)
Public Health Statements on various hazardous substances
Substances Most Frequently Found in Completed Exposure Pathways -1999
The Toxicologic Hazard of Superfund Hazardous Waste Sites
Top 20 Hazardous Substances–ATSDR/EPA Priority List 1999
ToxFAQs

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