
Agency for Toxic Substances and Disease Registry

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**U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
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Foreword

The Agency for Toxic Substances and Disease Registry (ATSDR) was created to prevent or mitigate adverse human health effects and diminished quality of life resulting from exposure to hazardous substances in the environment. More specifically, by congressional mandate, ATSDR establishes linkages between human exposure to hazardous substances and any increased incidence of adverse health effects by applying state-of-the-art scientific methods, creating and building relevant databases, and identifying appropriate target populations for investigation.

During this reporting period, an expansion of the database used to conduct health assessments occurred with the addition of health outcome data and community health concerns. To facilitate the adjustments in the health assessment process, interim guidelines were developed to incorporate health outcome data and community concerns into health assessments. In addition, ATSDR continued to conduct health studies and implement health effects research. The findings of such research have been included in the development of Case Studies in Environmental Medicine and Toxicological Profiles.

The Agency works to conduct and apply good science in collaboration with other agencies and organizations. We believe this attitude has been important to the success of ATSDR in building an agency assigned with principal federal responsibility to protect the American public from hazardous substances present in the environment.

This report summarizes all major programs and accomplishments that occurred in Fiscal Year 1990. Comments from interested readers are always welcome.

William L. Roper, M.D., M.P.H.
Administrator

Background

MISSION

The Agency for Toxic Substances and Disease Registry (ATSDR) was created to prevent or mitigate adverse human health effects and diminished quality of life resulting from exposure to hazardous substances in the environment. To support this mission ATSDR is committed to pursuing four goals:

GOALS OF ATSDR

- GOAL 1:** Identify adverse human health outcomes potentially related to the release of hazardous substances;
- GOAL 2:** Determine relationships between identified adverse human health outcomes and hazardous substances;
- GOAL 3:** Implement public health strategies to prevent or mitigate adverse human health outcomes related to hazardous substances; and
- GOAL 4:** Implement the infrastructure necessary to accomplish the ATSDR mission.

See Appendix A for the complete statement of the goals and objectives of the Agency.

LEGISLATIVE STATUTES

Congress has mandated ATSDR to carry out these health-related responsibilities under the following statutes:

- o The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, 42 U.S.C. 9601 et seq., also called Superfund);
- o The Superfund Amendments and Reauthorization Act of 1986 (Public Law [PL] 99-499, also known as SARA); and
- o The Resource Conservation and Recovery Act of 1976 [RCRA, PL 94-580, as amended by the Hazardous and Solid Waste Amendments of 1984 (PL 98-616, known as the 1984 RCRA Amendments)].

ORGANIZATIONAL STRUCTURE

Based on the aforementioned goals and mandates, ATSDR executes its operations through four administrative offices and four program-specific divisions:

Office of the Assistant Administrator (OAA)

Office of Program Operations and Management (OPOM)

Office of Policy and External Affairs (OPEA)

Office of Information Resources Management (OIRM)

Division of Health Assessment and Consultation (DHAC)

Division of Health Education (DHE)

Division of Health Studies (DHS)

Division of Toxicology (DT)

LEGISLATIVE RESPONSIBILITIES

The following paragraphs briefly summarize the range of activities specifically assigned to ATSDR under the original Superfund statute that created the Agency:

- o In cases of public health emergencies caused or believed to be caused by exposure to hazardous substances, assist, consult, and coordinate with private or public health care providers in providing medical care and testing exposed individuals, including collecting and analyzing laboratory specimens as may be indicated by the specific exposure incident.
- o Determine the extent of danger to public health from a release or threatened release of a hazardous substance. (This mandate covers the range of health assessment and other support activities provided to the U.S. Environmental Protection Agency [EPA], states, and other federal agencies at both emergency and immediate-removal and at remedial Superfund sites.)
- o Conduct periodic surveys and screening programs to determine relationships between exposure to hazardous substances and illness. (This mandate includes in vivo and in vitro toxicological testing, human epidemiologic studies, and the establishment of surveillance systems.)
- o Establish and maintain a registry of serious diseases and illnesses and registries of persons environmentally exposed to hazardous substances, whenever inclusion of such persons in registries would be scientifically appropriate or valuable for long-term follow-up or specific scientific studies.
- o Establish and maintain a comprehensive and publicly accessible inventory of literature, research, and studies on the health effects of hazardous substances.

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

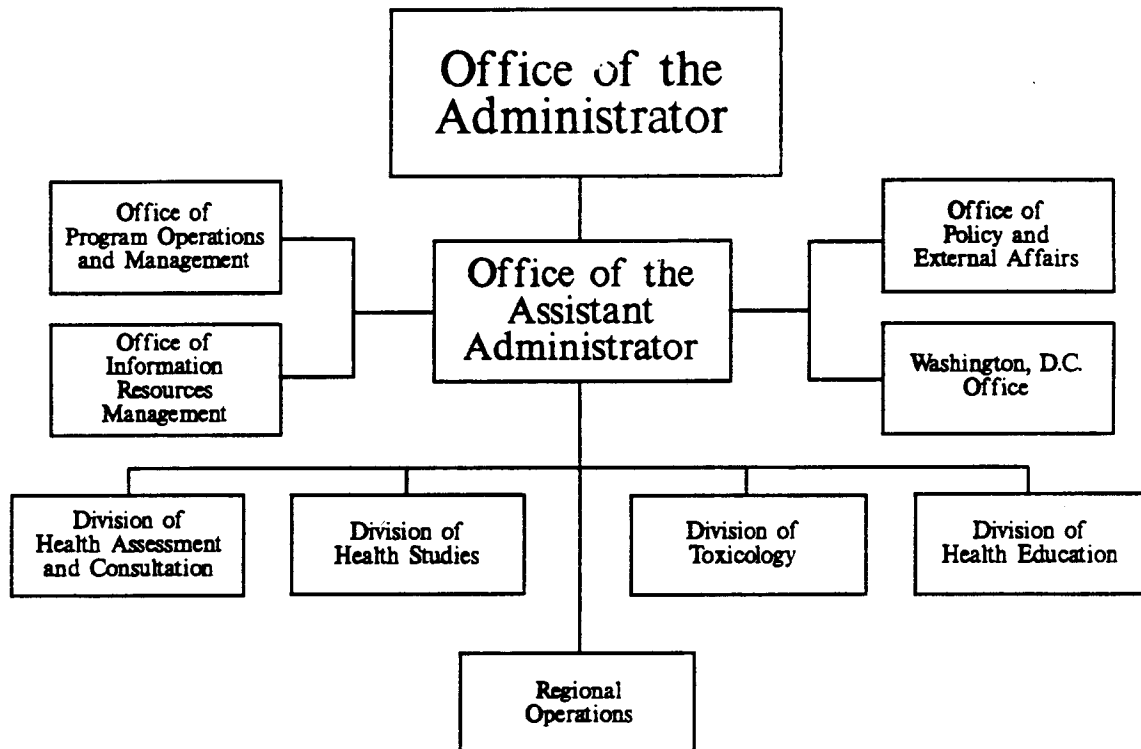
- o **Toxicological information and research:** create "Most Hazardous Substances Listing" by certain timeframes; publish toxicological profiles on these substances by certain timeframes; and assure initiation of a substance-specific research program for missing information on key health effects.
- o **Site-specific health concerns:** provide consultations to EPA, state, and local officials; perform health assessments on all National Priorities List (NPL) sites by speci-

fied timeframes; perform petitioned health assessments; conduct pilot health effects studies; conduct epidemiologic studies; establish exposure registries; and initiate health surveillance programs.

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

The sections that follow in this report describe the significant activities and accomplishments made by the Agency as a whole, as well as by each division and office, that pertain to the statutes mentioned above.

ATSDR Organization Chart



Executive Summary

During this reporting period, the Agency made significant accomplishments toward achieving its mission. Each administrative office and division has worked to execute the legislative mandates of the Agency. The following list of accomplishments describes the major thrust of Agency activities:

- o ATSDR is mandated to provide consultations upon request to the Administrator of the Environmental Protection Agency and to state and local officials on health issues relating to exposure to hazardous substances. Public health advisories were prepared for two sites: 1) the Bunker Hill site in the Silver Valley of northern Idaho and 2) the Caldwell Systems, Inc. facility in Caldwell County, near Lenoir, North Carolina.
- o Through its Division of Health Assessment and Consultation, ATSDR conducted a total of 408 health assessments and preliminary health assessments and ten petitioned health assessments.
- o A health outcome data workgroup was established to develop interim guidelines to address the integration of health outcome data and community concerns into the health assessment process.
- o The final draft of the **Health Assessment Guidance Manual** was released for public review and comment. This manual presents a detailed description of how to prepare a health assessment.
- o ATSDR participated in 11 simulated hazardous substance emergencies, many of which involved more than 100 participants and 300 observers from federal, state, and local agencies and organizations.

- o The Agency continued to work on its Lead Initiative to evaluate completed health assessments for sites that have lead as a contaminant of concern.
- o The Division of Toxicology published the third list of most hazardous substances that will be the subject of toxicological profiles. This list was published in the October 26, 1989, issue of the **Federal Register**.
- o The Division of Toxicology also published a notice in the **Federal Register** on March 28, 1990, which identified the priority data needs for four pilot substances: phenol, chloroethane, carbon tetrachloride, and isophorone.
- o Toxicological profiles on a total of 94 substances and five updates were available to the public by the end of FY 1990.
- o ATSDR, in cooperation with the National Toxicology Program, continued to conduct studies on the health effects of hazardous substances. These included studies of reproductive, toxic, developmental, and chronic effects.
- o A total of 13 trichloroethylene (TCE) subregistries were established at the following locations:
 - 3 in Michigan (Battle Creek, Dowagiac, and Albion);
 - 4 in Indiana (St. Joseph and Elkhart Counties); and
 - 6 in Illinois (Winnebago and Ogle Counties).
- o ATSDR, through its Division of Health Studies, also established dioxin registries at four NPL sites in Missouri: Times Beach, Minker/Stout/Romaine Creek, Quail Run Mobil Manor, and Shenandoah Stables.
- o Through its Division of Health Education, ATSDR has developed a series of self-instructional documents called **Case Studies in Environmental Medicine**. Final drafts of four monographs to be included in this series--lead, radon, vinyl chloride, and methylene chloride--were completed.
- o A cooperative agreement was awarded to the National Association of County Health Officials to develop short courses to educate health professionals about the surveillance, diagnosis, and treatment of persons exposed to hazardous substances.

- o In collaboration with the Centers for Disease Control, ATSDR funded a cooperative agreement with the Association of Occupational and Environmental Clinics to evaluate the validity and usefulness of a screening panel for immune system biomarkers. The screening panel will consist of standard immunological laboratory tests (flow cytometry) to examine lymphocytes and measure cell-type ratios.
- o ATSDR, the Health Resources and Services Administration, and Wayne State University cosponsored a study of hazardous waste management education and training programs in the United States. The results of this study are presented in chapter four.
- o ATSDR began to develop and implement the Hazardous Substance Data Management System (HAZDAT). HAZDAT is a scientific and administrative database designed to manage data collection, retrieval, analysis, and utilization through the more sophisticated technologies provided by computerization.
- o ATSDR has signed a Memorandum of Understanding with the Department of Defense and interagency agreements with relevant component agencies (Department of the Army, Department of the Navy, Department of the Air Force, and Defense Logistics Agency) to perform health assessments and related activities at NPL sites, and to prepare toxicological profiles.
- o Under the aegis of the Minority Environmental Health Program Initiative, ATSDR sponsored its first National Minority Health Conference in Atlanta. The purpose of the conference was to advance scientific knowledge of minority health issues associated with hazardous substances and to identify the research and informational needs of environmental health professionals.
- o The National Research Council, the National Academy of Sciences, and ATSDR formed a five-year cooperative agreement to further the scientific and technical foundations of environmental sciences and public health. ATSDR continued its work on projects to identify biologic markers that could be employed by ATSDR in fulfilling its mandates in both health assessment and public health follow-up of persons exposed to hazardous substances

stemming from hazardous waste sites and spontaneous releases of hazardous substances into the environment.

- o During this reporting period, ATSDR began the implementation and tracking of the respective activities that make up the ATSDR actions for the **Plan to Improve Public Health in the United States**.
- o ATSDR staff have been involved in the development of **Healthy People 2000: National Health Promotion and Disease Prevention Objectives**. This document attempts to develop a national strategy for significantly improving the health of the nation over the coming decade.
- o Recognizing the opportunities and potential benefit to Superfund programs through international research and exchange of information, ATSDR continued to enhance its worldwide contacts.
- o In FY 1989, the ATSDR Board of Scientific Counselors suggested that ATSDR make its peer review process more formal and more rigorous. As a result, all protocols, studies, and results of research that are carried out or funded in whole or in part by ATSDR are peer reviewed. In addition, studies that have not previously been peer reviewed that are intended to be used in the ATSDR toxicological profiles are now peer reviewed.

In the following sections, which are organized by ATSDR divisions and programmatic activities, these summary statements are described in more detail.

Chapter One

DIVISION OF HEALTH ASSESSMENT AND CONSULTATION

LEGISLATIVE MANDATES

The Agency for Toxic Substances and Disease Registry (ATSDR) is mandated by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the Resource Conservation and Recovery Act (RCRA), as amended, to:

- o provide consultation on health issues related to exposure to hazardous or toxic substances;*
- o complete health assessments for all sites on the National Priorities List (NPL) by December 10, 1988; complete health assessments for all proposed sites within one year of the date they are proposed for addition to the NPL;*
- o address petitioned requests for health assessments;*
- o provide consultations upon request to the Administrator of EPA and to state and local officials on health issues relating to exposure to hazardous or toxic substances on the basis of available information; and*
- o determine the extent of danger to public health from a release or threatened release of a hazardous substance.*

The Division of Health Assessment and Consultation (DHAC) is responsible for administering these mandates. In this chapter, we detail the progress and accomplishments of DHAC in addressing each of these mandates during the FY 1990 reporting period.

The primary focus of division activity during this reporting period involved improving the existing procedures for collecting data necessary for conducting health assessments. DHAC underwent an extensive reevaluation of its health assessment process to include more considerations specific to the local community affected by the assessment process. In making the much needed adjustments, the division implemented changes in a wide array of activities.

Definitions

A **public health advisory** is a communication from the Administrator of ATSDR to the Administrator of EPA advising that a public health threat of such importance and magnitude exists that EPA should take immediate intervention. The advisory is also provided to the appropriate EPA regional office and state health department.

A **health assessment** is a written evaluation of the public health impact of hazardous substances that have been released into the environment in a specific geographic area. Before writing a health assessment, ATSDR staff review detailed information about the area or site (e.g., physical, geographical, historical, and operational setting of the site; environmental contamination and physical hazards at the site; potential pathways for further environmental contamination and human exposure to hazardous substances; demographics and concerns of the community surrounding the site; and available health outcome data) and determine whether, and to what extent, persons have been exposed to hazardous substances.

A **petitioned health assessment** is a health assessment conducted at the request of a member of the public. When a petition is received, a team composed of environmental and health scientists is assigned to gather information to ascertain, based on standard public health criteria, whether there is a reasonable basis for conducting a health assessment. Once ATSDR confirms that a health assessment is needed, the petitioned health assessment process is essentially the same as the health assessment process, with the exception that health assessments for petitioned sites generally receive greater attention from the public and the press, and consequently, communication issues related to them often are more complex.

fences and gates to deter public access. Although most of the site remains unfenced because it comprises residential areas and wilderness, the smelter complex itself (which has the most highly contaminated areas) is fenced. The asbestos on building exteriors has been removed or sealed in place to prevent its release into the environment. Some contaminated areas (e.g., the copper dross flue dust pile, which contains 10% to 30% arsenic and covers about one acre) have been partially stabilized, and the owners have stopped all salvaging activities.

*ATSDR Public Health Advisory
Leads to Health Study*

The Caldwell Systems, Inc. (CSI) site is located in a rural area of Caldwell County, near Lenoir, North Carolina. The facility operated as a hazardous waste incinerator under a state Resource Conservation and Recovery Act (RCRA) interim status permit from 1976 to May 1988, and as a hazardous waste blending and bulking facility from May 1988 to December 1989. CSI incinerated wastes from North Carolina furniture manufacturers (e.g., paint, lacquer, toluene, xylene, and other solvents), spent torpedo fuel from the Department of the Navy, and hazardous wastes from out of state. The CSI incinerator facility operated on a few acres leased from a municipal landfill where illegal burial and dumping may have occurred. On September 13, 1989, a fire at CSI forced the evacuation of approximately 250 area residents. Local hospitals treated 54 persons for respiratory ailments. Before CSI stopped incinerating hazardous wastes in May 1988, many residents in nearby areas complained of experiencing respiratory problems, eye and skin irritation, and nausea whenever the CSI incinerators were operating.



At the request of EPA, ATSDR provided an emergency consultation in May 1990 of the public health threat posed by this site. ATSDR concluded that past work practices at CSI had created a continuing health threat for the 218 former employees who worked at the site and also possibly for persons living within 1.5 miles of the site (279 households).

ATSDR recommended additional environmental sampling, a survey of area wells, and a joint ATSDR/National Institute for Occupational Safety and Health (NIOSH) study of the health status of area residents and former CSI employees and their families. Because of the urgent public health concerns at this site, ATSDR issued a public health advisory on July 25, 1990. ATSDR is currently conducting a health assessment of the site

A **preliminary health assessment** is prepared on sites for which incomplete site characterization is available or when no existing summary of extensive environmental data exists [e.g., an EPA Remedial Investigation/Feasibility Study (RI/FS) or its equivalent]. For those sites receiving preliminary health assessments, further health assessments may be appropriate when the full environmental characterization is completed and provided to ATSDR for consideration.

A **health consultation** is a written or verbal response by ATSDR staff to a request for information about health risks posed by a specific site, chemical release, or hazardous material. In order to prevent or mitigate exposures, these consultations may lead to specific actions such as restricting or replacing water supplies, intensifying environmental sampling, restricting access to the site, or removing the contaminated material.

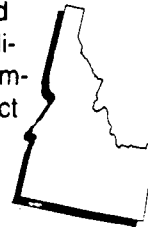
HIGHLIGHTS OF DIVISION ACCOMPLISHMENTS

Public Health Advisories

ATSDR is mandated to provide consultations upon request to the Administrator of EPA and to state and local officials on health issues relating to exposure to hazardous substances. During this reporting period public health advisories were prepared for two sites: 1) the Bunker Hill site in the Silver Valley of northern Idaho and 2) the Caldwell Systems, Inc. facility in Caldwell County, near Lenoir, North Carolina.

ATSDR Public Health Advisory Convinces Owner To Take Corrective Action

On October 5, 1989, after a site visit confirmed that conditions at Bunker Hill presented an immediate and significant public health risk, ATSDR recommended that EPA immediately take steps to restrict access to the site and suspend all salvaging operations until an approved site safety plan could be implemented. Potential health risks at the site included fire hazards, ease of access to the site, and levels of chemical contamination high enough to produce severe toxicity.



The Bunker Hill public health advisory prompted EPA to order Bunker Limited Partnership (current owner of the site), and other parties responsible for contamination of the site, to take immediate action to correct health hazards at the site. In response to that order, Bunker Limited Partnership installed several new

and working with NIOSH on the protocol for a pilot health study of the workers, the workers' families, and residents living within 1.5 miles of the site.

Health Assessments

ATSDR, through DHAC, continued conducting health assessments through its cooperative agreement program with 23 states. A total of 408 health assessments and preliminary health assessments and ten petitioned health assessments have been conducted during this reporting period. See Appendix C for a list of completed health assessments. To assist in the scoping and preliminary evaluation of sites for which health assessments are conducted, DHAC used the Toxic Chemical Release Inventory (TRI). TRI contains information on the annual estimated releases of toxic chemicals to the environment. These data include names and addresses of the facilities and the amounts of certain toxic chemicals they release to the air, water, or land or transfer to waste sites.

All 23 of the cooperative agreement states were visited during this FY 1990 reporting period. These visits were conducted to negotiate a health assessment workplan for each state based on statutory deadlines and Record of Decision schedules of EPA for NPL sites. In addition, discussions also included:

- o new procedures for handling state-prepared health assessments;
- o a process for handling consultations on NPL sites;
- o the status of health assessment programs within each state health department; and
- o the resolution of any existing cooperative agreement issues.

See Appendix D for a complete list of cooperative agreement states.

Changes in the Health Assessment Process

Enhanced Community Involvement

DHAC expanded the database used to conduct health assessments. Two important components were added: health outcome data and community health concerns information. To facilitate this adjustment in the health assessment process.

DHAC developed interim guidelines to incorporate health outcome data and community concerns into health assessments. To increase community involvement in the health assessment process, a community involvement liaison position was created within the Division.

Community Involvement Liaison - DHAC intends to involve the community in the health assessment process at the earliest opportunity in order to maintain better two-way communication with the community and other involved parties throughout the process, and solicit and respond to community comment for the final health assessment report. During the health assessment process the community involvement liaison staff position serves as the Agency point for citizens to directly share their concerns for response and inclusion in the health assessment process.

1990 Citizens' Roundtable - DHAC sponsored a Citizens' Roundtable in June 1990. The purpose of the roundtable, attended by citizens, community representatives, and environmental groups, was to:

- o provide communities with the opportunity to express their needs and concerns to ATSDR;
- o provide ATSDR with the opportunity to explain what the Agency does and will do in the future;
- o determine how well ATSDR addresses the needs and concerns identified by community representatives and their technical advisors and
- o seek ways ATSDR and communities can work together to address those needs and concerns.

DHAC plans to hold such meetings and community health assessment workshops on a regular basis. As an outgrowth of the June 1990 Citizens' Roundtable, four national health assessment workshops will be conducted in 1991. These workshops will be designed to provide information to individual communities on the revamped health assessment process and create an opportunity for ATSDR staff to learn firsthand from communities what their needs and concerns are relative to exposure to hazardous substances that may be present in the environment.

Public Comment

DHAC also developed and began implementing public comment procedures for health assessments. The public comment period will be for 30 days, and all health assessments will be subject to the procedures. Contingent upon community interest and the extent and complexity of comments received during the public comment period, public meetings may be used to present health assessment findings. Health assessors will respond to all public comments and revise draft health assessments, where appropriate.

**Health Activities
Recommendation Panel**

ATSDR has established a process for recommending follow-up health activities in populations living near hazardous waste sites. To guide this process, the Health Activities Recommendation Panel (HARP) was established. This Agency-wide panel consists of ATSDR staff with expertise in medicine, toxicology, environmental health, epidemiology, and education. Health assessment cooperative agreement states participate in an advisory status. Each draft health assessment, as well as each draft health consultation and public health advisory, is reviewed to recommend appropriate follow-up health actions. These follow-up health actions are linked to the degree of hazard the hazardous waste site under investigation poses. The panel considers three types of follow-up: health studies, health education, and substance-specific applied research. The responsibilities for this activity rest with DHAC.

**Guidelines for
Conducting Health
Assessments**

DHAC developed a manual that illustrates the procedural guidelines for conducting health assessments. The final draft of the **Health Assessment Guidance Manual** was released for public review and comment in August 1990. This manual presents a detailed description of how to prepare a health assessment. The health assessor is instructed in how to collect, interpret, and present the appropriate data and information. The health assessment format is described, and an illustrated example is provided. The manual also contains several appendices that present information on regulatory standards, health guideline values, data evaluation criteria, estimations of exposure, and other useful information. The Agency anticipates that the final version of the manual will be released in FY 1991.

DHAC also prepared draft Environmental Media Evaluation Guides (EMEGs) to assist health assessors in evaluating a site. These guides will aid the assessor in deciding which contaminants warrant further evaluation based on their risk to public health, and which do not. EMEGs are media-specific screening values that are used to select contaminants of potential health concern at hazardous waste sites. They are derived from the

Minimal Risk Levels presented in the ATSDR toxicological profiles. EMEGs are expressed as a range of concentrations for a specific chemical substance in a specific environmental media (water, soil, air).

Communication Training

An interactive health communication training workshop was developed to improve communication between environmental public health professionals and communities near hazardous waste sites. This workshop will be available to staff in all states that have cooperative agreements with ATSDR to perform health assessments. The training is aimed at providing environmental public health professionals with the skills needed to effectively communicate environmental health information to the public.

Emergency Response

Emergency Simulations

The ATSDR emergency response staff and regional ATSDR staff are an integral part of the National Response Simulation Design Team and participate fully in developing, implementing, and evaluating simulated emergencies involving hazardous substances. During this reporting period, ATSDR participated in 11 simulated hazardous substance emergencies, many of which involved an average of 100 participants and 300 observers from federal, state, and local agencies and organizations.

ATSDR also supports emergency response activities in five of the 23 state health departments that have cooperative agreements with ATSDR for conducting health assessments. These activities include:

- o building the capacity of these health departments to plan, stage, and evaluate simulations;
- o providing training in emergency management system operations and services integrations; and
- o recording and analyzing emergency response data.

As a result of ATSDR activities in this area, the capability of participating states to respond to an emergency involving hazardous substances has been significantly improved. See Appendix E for a list of health consultations and emergency response activities of the Division.

ANSWER Workstation

DHAC continued to provide technical support to the ATSDR/ National Library of Medicine Workstation for Emergency Response (ANSWER). ANSWER is a computer-based information

system which provides 1) information from the Toxicology, Occupational Health, Medical Treatment, Environmental Series (TOMES) industrial chemical database, 2) current weather information from the National Oceanic and Atmospheric Administration, and 3) a plume dispersion model that allows the user to assess potential threats to the public from a release of hazardous materials into the air.

Training and Assistance

ATSDR-supported health care specialists have developed written guides for emergency medical technicians and hospital room staff for managing chemically contaminated patients in hazardous substance emergencies. ATSDR also is developing companion videotapes for these written guides.

A meeting was held with representatives from the Iowa, Colorado, Wisconsin, New Hampshire, and Michigan Health Departments, the National Library of Medicine (NLM), and surveillance project personnel of the Agency to discuss the surveillance systems proposed for emergency response and the event data file. The purpose of the surveillance system is to document uncontrolled releases of hazardous substances leading to evacuation, injury, or a loss of life. This activity was funded under the DHAC emergency response section of the state cooperative agreements; however, the data are being used primarily by the Division of Health Studies.

ATSDR Lead Initiative

ATSDR continued work on its Lead Initiative to evaluate completed health assessments for sites that have lead as a contaminant of concern. This project stems from a report to Congress, **The Nature and Extent of Lead Poisoning in Children in the United States**, published by ATSDR in July 1988. The goal of this project is to prevent lead toxicity in young children who are exposed to lead released from Superfund sites and facilities.

Under this initiative, ATSDR will evaluate lead sites for which a health assessment has been conducted, determine the status of each, identify the populations of concern, and initiate any appropriate health follow-up. In addition, the project is designed to increase the capacity of the Agency to identify common features of both lead-contaminated sites and those populations potentially exposed to lead contamination. Specifically, the initiative will enable the Agency to:

- o evaluate whether the recommendations of the 1988 Lead Report are adequately addressed in health assessments

- o evaluate the health assessment process as it affects public health at lead sites;
- o reassess health assessments on sites with lead contamination, based on new scientific data; and thereby
- o identify any populations for which ATSDR should undertake health follow-up activity.

SUMMARY

The Division of Health Assessment and Consultation continues to play an important role in realizing the mission of the Agency. Health assessments conducted by DHAC are essential in determining the extent of danger to public health from a release or threatened release of a hazardous substance. Because health assessments are such an integral part of this mission, the changes made by DHAC to include more health and environmental data as well as community concerns have been well received. The incorporation of these changes into the health assessment process will significantly enhance the overall ability of the Agency to retrieve and evaluate all information necessary to determine the public health implications at a site.

Chapter Two

DIVISION OF TOXICOLOGY

LEGISLATIVE MANDATES

Section 104(i)(2) of CERCLA, as amended, mandates that ATSDR, in cooperation with EPA, shall identify and rank at least the 100 most hazardous substances found at National Priorities List (NPL) sites by April 17, 1987; list at least the second 100 most hazardous substances found at NPL sites by October 17, 1988; and list at least an additional 25 most hazardous substances found at NPL sites by October 17 of each successive year.

Section 104(i)(3) of CERCLA, as amended, mandates that ATSDR shall prepare a toxicological profile for each NPL site hazardous substance identified and ranked by ATSDR and EPA. Each profile must contain:

- o an examination, summary, and interpretation of available toxicological information and epidemiologic evaluations on the hazardous substance to ascertain the levels of significant human exposure for the substance and the associated acute, subacute, and chronic health effects;*
- o a determination of whether adequate information on the health effects of each substance is available or is in the process of development to determine levels of exposure that present a significant risk to human health of acute, subacute, or chronic health effects; and*
- o where appropriate, an identification of toxicological testing needed to identify the types or levels of exposure that may present significant risk of adverse health effects in humans.*

Section 104(i)(5) of CERCLA, as amended, mandates that ATSDR, in cooperation with the National Toxicology Program (NTP), shall assure the initiation of a program of research designed to determine the health effects of substances for which ATSDR, EPA, and other Public Health Service agencies have determined that health effects information is inadequate. It was the intent of Congress that the cost of conducting the research program be borne by private industry using the Toxic Substances Control Act (TSCA) or the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) or through cost recovery under CERCLA.

The Division of Toxicology has responded to these mandates by identifying priority hazardous substances, developing toxicological profiles, and implementing health effects research. The toxicological profiles characterize environmental, toxicological, and health effects information for the hazardous substances being described. In this chapter we detail the progress and accomplishments of the Division toward further addressing these mandates.

HIGHLIGHTS OF DIVISION ACCOMPLISHMENTS

Identification and Ranking of Hazardous Substances

Third List of Hazardous Substances

CERCLA, as amended by SARA, establishes certain requirements for ATSDR and EPA regarding the hazardous substances which are most commonly found at facilities on the CERCLA National Priorities List (NPL). CERCLA (42 U.S.C. 9604(i)(2)) required that the two agencies prepare a list of at least 100 hazardous substances most commonly found at NPL facilities that pose the most significant potential threat to human health. CERCLA also required the agencies to add to the priority list 100 or more additional hazardous substances, and to include at least 25 additional hazardous substances in each of the three successive years. The priority list of the first 100 substances was published in the April 17, 1987, issue of the **Federal Register**. The priority list of the second 100 substances was published in the October 20, 1988, issue of the **Federal Register**.

The Division of Toxicology published the third list of hazardous substances that will be the subject of toxicological profiles. This list was published in the October 26, 1989, issue of the **Federal Register** (see Figure 1).

Third List of Hazardous Substances To Be Subject of Toxicological Profiles (Published October 26, 1989)	
Ethyl ether (Diethyl ether)	2,3-Benzofuran
Ethanol	Phorate
Isopropanol	Cresols
Methyl mercaptan	Aluminum
Dichlorofluoromethane (Freon 21)	Titanium
Propanoic acid (Propionic acid)	Nitric acid
Methyl acetate	Bromine
Biphenyl (Diphenyl)	Dichlorobenzene
2-Furancarboxaldehyde (Furfural)	Trichloroethane
p-Nitroaniline (4-Nitroaniline)	3-Methyl phenol (m-Cresol)
Butadiene (1,3-Butadiene)	Heptachlorodibenzene
Pyridine	Methyl parathion
Diacetone-alcohol (4-Hydroxy-4-methyl-2-pentanone)	

Figure 1

Work was completed on the fourth list of hazardous substances that will be the subject of toxicological profiles. This notice is expected to be available for public comment by October 17, 1990 (see Figure 2).

Fourth List of Hazardous Substances To Be Subject of Toxicological Profiles (To Be Published October 17, 1990)	
Trichlorobenzene	1-Butanol (n-Butyl alcohol)
Dicyclopentadiene	1,2,3-Trichlorobenzene
2-sec-Butyl-4,6-dinitrophenol	Furan
1-(Methylethyl)-benzene (Cumene)	1,3-Dinitrobenzene
4-Nitrotoluene	Benzyl chloride
4-Chlorophenol	Butanoic acid (Butyric acid)
bis(2-Chloro-1-methylethyl) ether	2-Methylpyridine
1,2,4,5-Tetrachlorobenzene	n-Propyl benzene
n-Butyl acetate (Acetic acid, butyl ester)	
Ethyl acetate (Acetic acid, ethyl ester)	
p-Methyl styrene	Propenyl benzene
Octachlorodibenzo-p-dioxin	Hydrochloric acid
bis(2-Chloroisopropyl) ether	Phosphoric acid
Dimethyl aniline (N,N-Dimethylaniline)	

Figure 2

The Division initiated work to revise the algorithm for selecting priority hazardous substances. The new algorithm will reflect information from the ATSDR Hazardous Substance Data Management System (HAZDAT). The new algorithm will be published for public comment in FY 1991, and a new list of 275 priority

hazardous substances will be developed and announced in FY 1992. See Appendix F for a list of the 250 priority substances compiled as of this reporting period.

Preparation of Toxicological Profiles

The Division of Toxicology continued to prepare toxicological profiles on hazardous substances as mandated by SARA. Profiles on a total of 94 substances and five updates were available to the public by the end of FY 1990. In addition, work was completed on an additional 36 substances that are expected to be announced in the **Federal Register** during the first quarter of FY 1991. See Appendix G for a listing of the 130 substances that have been profiled.

Each profile prepared for a listed substance includes an examination, summary, and interpretation of available toxicological information and epidemiologic evaluations. The information and data are to be used to ascertain the levels of significant human exposure for the substance and the associated health effects. The profiles also include a determination of whether adequate information on the health effects of each substance is now available or in the process of development. This information will be used to identify the types or levels of exposure that may present significant risk of adverse health effects in humans.

Toxicological Research Information

When adequate information on the health effects of a hazardous substance is not available, ATSDR, in cooperation with the National Toxicology Program (NTP), is required to initiate a program of research designed to determine these health effects. In developing and implementing a research program, ATSDR is required to coordinate with EPA and NTP to avoid duplicative research in other programs and under other authorities.

National Toxicology Program

ATSDR has supported studies at NTP for substances of importance to Superfund. Studies that are under way or that were completed during this reporting period are listed in Figure 3.

Chemical Mixture Studies

In compliance with the mandate, ATSDR proceeded to conduct studies on the toxicology of chemical mixtures. Since the inception of this testing program, 48 chemicals or chemical classes have either been tested or have been selected for testing. These include volatile organic compounds, phthalate

National Toxicology Program Studies	
Substance	Type of Study
Pentachlorobenzene	Reproductive
Cresols (o- & m-)	Toxicity
Cupric sulfate	Toxicity
cis/Trans-Dichloroethylenes	Developmental
Ethyl benzene	Chronic
Hexachlorocyclopentadiene	Chronic
Sodium selenate/selenite	Toxicity
1,1,2,2-Tetrachloroethane	Developmental
Mixture (Pesticide/Fertilizer)	Toxicity
	Developmental
	Reproductive

Figure 3

esters, phenols, inorganic compounds, chlorobenzenes, and several chemical mixtures. Currently, two separate mixture studies are under investigation:

- o a study investigating exposures to a mixture of 19 organic and six inorganic substances commonly found at Superfund sites; and
- o a study involving exposures to varying mixtures of pesticides and fertilizers.

The research efforts undertaken by the Division of Toxicology with the National Toxicology Program will have a profound effect on toxicological research and the scientific community. Very little information has been published in the scientific literature on the assessment of health risks following exposure to mixtures. The mixture studies now in progress provide pioneering work in this field, and the results will be used by scientists to gain insights and advance knowledge about the effects of human exposure to complex mixtures.

Substance-Specific Applied Research Program

The Division of Toxicology implemented the substance-specific applied research program during the reporting period. The major purpose of the substance-specific research program is to supply the informational needs of the Agency regarding health assessments. As mandated, the program shall include, to the extent necessary to supplement existing information, but shall not be limited to:

- o laboratory and other studies to determine short, intermediate, and long-term health effects;
- o laboratory and other studies to determine organ-specific, site-specific, and system-specific acute and chronic toxicity;
- o laboratory and other studies to determine the manner in which such substances are metabolized or to otherwise develop an understanding of the biokinetics of such substances; and
- o where there is a possibility of obtaining human data, the collection of such information.

Exposure data collected from the ATSDR substance-specific research program will be used to complement data currently collected on a site-specific basis by the Division of Health Studies and the Division of Health Assessment and Consultation. More specifically, these data will be used by the Agency to assist in identifying populations requiring follow-up exposure or health outcome studies. Details of this program are described in the **ATSDR Decision Guide for Identifying Substance-Specific Data Needs Related to Toxicological Profiles**.

Identification of Priority Data Needs

The Division of Toxicology published a notice in the **Federal Register** on March 28, 1990, which identified the priority data needs for four substances: phenol, chloroethane, carbon tetrachloride, and isophorone. Approximately 110 data needs were identified for these four substances in the toxicological profiles. Upon application of the tenets used to set priorities presented in the **ATSDR Decision Guide for Identifying Substance-Specific Data Needs Related to Toxicological Profiles**, about 25 of the data needs were identified as priorities and announced to the public.

All four substances (phenol, chloroethane, carbon tetrachloride, and isophorone) are listed in ATSDR's second data group of priority hazardous substances. The selection of these four substances for this pilot exercise does not imply anything about their overall priority of concern with respect to health effects.

The Division also prepared a draft paper entitled **Determination of Priority Data Needs from Data Needs Identified in the Toxicological Profiles**. The purpose of this paper is to detail the criteria applied by the Agency in assigning priority to substance-specific data needs identified in the profiles. A second draft paper entitled **Criteria for Assigning Priority to Sub-**

stances for Initiation of the ATSDR Substance-Specific Research Program was recently prepared and is now under ATSDR review.

The Division has identified the subset of priority hazardous substances that will initiate the substance-specific applied research program (see Figure 4). Priority data needs documents will be developed for each of the substances, and a compendium of priority data needs will be announced in the **Federal Register** for public comment in FY 1991.

List of Substances for the Substance-Specific Research Program	
Carbon tetrachloride	Chloroethane
Selenium	Toluene
Zinc	p,p'-DDT, DDE, DDD
Mercury	Trichloroethylene
Tetrachloroethylene	Vinyl chloride
Chromium	Methylene chloride
Arsenic	Chloroform
Cadmium	Benzene
Beryllium	Lead
Aldrin/Dieldrin	Nickel
Cyanide	Di(2-ethylhexyl)phthalate
Polychlorinated biphenyls:	
Aroclor-1260, -1254, -1248, -1242	
-1232, -1221, and -1016	
Polycyclic aromatic hydrocarbons:	
Acenaphthene, Acenaphthylene, Anthracene	
Benzo(a)anthracene, Benzo(a)pyrene	
Benzo(b)fluoranthene, Benzo(g,h,i)perylene	
Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene	
Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene	
Phenanthrene, Pyrene	

Figure 4

SUMMARY

The priority list of hazardous substances published by the Division of Toxicology is evaluated annually to assure inclusion of the most recent and comprehensive information. To assist this effort, ATSDR has developed the HAZDAT system, a scientific and administrative database designed as a repository for information on hazardous substances found at NPL and non-NPL waste sites or emergency events and on the potential health effects of hazardous substances on human populations. (HAZDAT is discussed in detail in Chapter Five.) Additional research is planned by the Division to address all priority questions regarding unknown health effects which may occur from exposure to these substances.

Chapter Three

DIVISION OF HEALTH STUDIES

LEGISLATIVE MANDATES

CERCLA requires that ATSDR, in cooperation with the states, establish and maintain national registries of 1) persons exposed to hazardous substances and 2) persons with serious diseases or illness. In addition, SARA mandates that ATSDR must consider establishing a registry as a follow-up to a health assessment when the results indicate a potentially significant risk to human health.

ATSDR is mandated by Section 104(i) of CERCLA, as amended, to:

- o conduct periodic survey and screening programs to determine relationships between exposure to toxic substances and illness;*
- o conduct pilot studies of the health effects of toxic substances for selected groups of exposed individuals to determine the desirability of conducting full-scale epidemiologic or other health studies of the entire exposed population and of conducting other epidemiologic studies where appropriate;*
- o conduct epidemiologic studies designed to evaluate the causal nature of associations between exposure to hazardous substances and disease outcome by testing scientific hypotheses; and*
- o conduct health surveillance programs of exposed populations, which shall include medical testing and referral for treatment.*

The Division of Health Studies (DHS) has the responsibility for carrying out these mandates. DHS conducts health studies which evaluate the health effects of human exposure to hazardous substances as technical assistance or under cooperative agreements or grants with state or local health departments. These studies, when combined with toxicological profiles and substance-release data, will form the basis for policy recommendations for safe and unsafe levels of exposure.

The legislative mandate for the development of national registries evolved from the need for fundamental information about the impact of low-level exposure to hazardous substances on human health. Registries serve an important role in assuring the uniformity and quality of collected data and ensuring that data collection is not duplicative, thus reducing the overall burden to exposed or potentially exposed persons.

HIGHLIGHTS OF DIVISION ACCOMPLISHMENTS

National Exposure Registry

The National Exposure Registry is comprised of chemical-specific subregistries designed to aid in assessing the long-term health consequences of low-level, long-term exposures to hazardous chemicals identified at Superfund sites. The National Exposure Registry will facilitate epidemiologic research and provide relevant information to the registrants.

In 1989 ATSDR completed, published, and distributed approximately 1,600 copies of **Policies and Procedures for Establishing a National Registry of Persons Exposed to Toxic Substances**. The policies and procedures detailed in this manual guide ATSDR selection of chemicals for subregistries, data collection sites, and registrants for the National Exposure Registry. This methodical approach ensures that data collected are correct, useful, consistent, and do not duplicate data already collected.

All of the chemicals for which ATSDR has published a toxicological profile were considered in the initial selection of chemicals for the first subregistries of the National Exposure Registry. Of the eight chemicals that warranted in-depth consideration--benzene, chromium, cyanide, di(2-ethylhexyl)phthalate or DEHP, dioxin, mercury, pentachlorophenol, and trichloroethylene (TCE)--three have been selected for subregistries:

TCE

Dioxin

Benzene

TCE Subregistry

TCE was selected for the first chemical subregistry to the National Exposure Registry because of its toxicity, ubiquitousness, and the lack of information on low-level, long-term exposure. The TCE subregistry was established at the following locations:

3 in Michigan (Battle Creek, Dowagiac, and Albion);
4 in Indiana (St. Joseph and Elkhart Counties); and
6 in Illinois (Winnebago and Ogle Counties).

Ten of these 13 sites are on the National Priorities List. For a summary of TCE activities, see Figure 5.

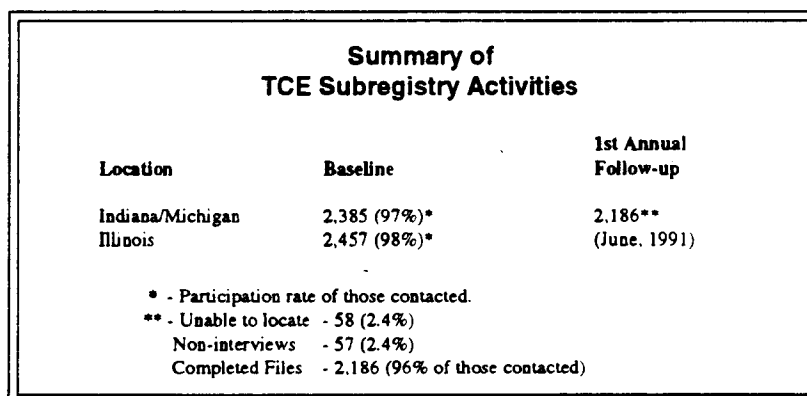


Figure 5

Dioxin Subregistry

To create the dioxin subregistry, ATSDR used criteria outlined in the **Policies and Procedures for Establishing a National Registry of Persons Exposed to Toxic Substances** to select a subset of the 2,887 persons contained in the Missouri Central Listing of persons potentially exposed to dioxin. The state of Missouri established the central listing in 1983 with support from ATSDR and CDC. Since 1987 Missouri has maintained this listing through grants awarded by ATSDR. The dioxin subregistry has been established at four NPL sites in Missouri--Times Beach, Minker/Stout/Romaine Creek, Quail Run Mobile Manor, and Shenandoah Stables. Baseline data collection for the ATSDR dioxin subregistry was completed in the fall of 1989.

Benzene Subregistry

ATSDR is selecting suitable sites for the benzene subregistry, and data collection for approximately 5,000 registrants has begun.

Subregistry Updates

ATSDR staff will begin preparing for the annual update of both the TCE and dioxin subregistries in October 1990. Annual updates will be completed through computer-assisted telephone

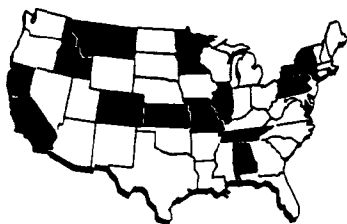
interviews. Registrants who do not have a telephone (less than 10%) may call ATSDR interviewers using a toll-free number. Updates that cannot be done by telephone will be conducted through personal interviews.

National Disease Registry

An initial planning document for development of the National Disease Registry was outlined and circulated for comment within ATSDR. This document contained a discussion of concepts, an overall registry rationale, and a proposed action plan to initiate development of the disease registry. This registry will be designed to ascertain the effects of waste sites on public health by examining existing health outcomes, while using existing databases and information as much as possible.

On May 2, 1990, ATSDR convened a panel of outside experts to discuss these topics in a public meeting. The panel submitted a report to the Agency, and it will be used as a resource in developing the disease registry. A draft policies and procedures manual for this registry is being developed.

Health Studies



ATSDR is mandated to conduct pilot studies of the health effects of toxic substances for selected groups of exposed individuals to determine the desirability of conducting full-scale epidemiologic or other health studies of the entire exposed population and of conducting other epidemiologic studies where appropriate. The following are summaries of the studies conducted during this reporting period:

Mill Services Site, Yukon, PA

ATSDR provided technical assistance to the Pennsylvania Department of Health to determine if residents of Yukon--near the Mill Services hazardous waste site--may have experienced an excess of adverse health problems as compared with residents of a similar comparison community.

Results of the study showed that although the rate of cancer reported by Yukon residents was higher, no difference in cancer rates between Yukon and a comparison community was demonstrated after verification of case reports. Although several self-reported symptoms were elevated in Yukon participants compared with comparison community participants, only a small number of diseases reported as diagnosed by a physician were elevated in Yukon participants compared with comparison com-

munity participants. Many of the self-reported symptoms were nonspecific. One possible explanation for the increase in reporting may be the recall bias that is inherent in a cross-sectional study design. The final report for this study was issued in May 1990.

Tennessee: Mercury Exposure Study

The purpose of this study was to provide technical assistance to the Tennessee Department of Health and Environment to assess the extent of mercury exposure among the families of the workers at the Olin Chemical Company, and to determine the association between mercury exposure and potential risk factors, such as household air concentrations, housekeeping activities, and recent dental fillings.

The study found that workers at the Olin Chemical Company--a chloralkali chemical plant in Charleston, Tennessee--were exposed to high levels of elemental mercury during a scheduled maintenance operation. There was evidence that they transported mercury to their homes when they drove home in their own trucks without changing clothes or showering. The urine mercury levels among household members of exposed workers were within the reference range for the general population and did not indicate mercury toxicity. People who lived in households that were vacuumed had higher mercury levels than those who did not. Floor washing was also associated with higher urine mercury levels. Mercury decontamination was subsequently conducted in houses where mercury concentrations exceeded 0.5 micrograms per cubic meter. The final report was released in December 1990.

Alabama: Childhood Lead Exposure Study

ATSDR funded a grant to the Alabama Department of Public Health to study lead exposure among residents living near the Interstate Lead Company smelter site in Jefferson County, Alabama. Investigators measured blood lead levels, erythrocyte protoporphyrin, and hemoglobin in a representative sample of 81 children under six years of age who lived in two study areas adjacent to the site. Staff performed a complete door-to-door census in both areas to locate all eligible children. Questionnaire data examined pathways of exposure to determine the extent to which behavioral, demographic, and other potentially confounding factors--including duration of residence and distance from Interstate Lead Company--influenced blood lead levels of the study participants. A final report will be released in 1991.

California: Dioxin Exposure Study

The purposes of this study are to compare the blood dioxin levels of persons consuming farm products with elevated concentrations of dioxins near Oroville, California, with levels of an unexposed local group, and with those of an unexposed population in Missouri; to examine levels of dioxin equivalents in Oroville and comparison serum samples; and to compare the pattern of dioxin and furans.

Blood samples were drawn on both exposed and unexposed persons, and laboratory analysis has been completed. A final report is expected in FY 1991.

Colorado: Mine Waste Exposure Study

ATSDR funded a grant to the Colorado Department of Health to study exposure to heavy metals among persons living in the vicinity of the Clear Creek/Central City Superfund site. The purposes of this study are to determine the levels of arsenic, cadmium, and lead in blood and urine of an exposed population, particularly young children, living in the surrounding communities; to determine if levels differ from those of unexposed populations and reference ranges; and to determine the extent to which environmental, behavioral, and socio-economic factors affected exposure.

Approximately 240 persons were selected from a complete door-to-door census of the area and invited to participate. An additional cohort of 196 participated from the Smuggler Mountain site in Aspen, which was added to the original study population. A final report is expected in late 1991.

Colorado: Heavy Metals Exposure Study

ATSDR funded a grant to the Colorado Department of Health to study persons exposed to heavy metals at the ASARCO, Inc. plant, which currently refines cadmium.

The purposes of this study are to compare blood lead levels and urine arsenic and cadmium levels in children aged six months to six years in two neighborhoods adjacent to the site, with levels in children from three other neighborhoods in urban Denver, one industrial and two nonindustrial, and to determine whether individual levels varied with environmental exposure among the 400 children located by a complete door-to-door census.

Children with levels considered to be health risks were referred for follow-up, and parents in all neighborhoods received information on heavy metals poisoning and its prevention. Follow-up

testing of approximately 50 children with abnormal initial cadmium readings was performed under carefully controlled environmental conditions. A final report is expected in late 1991.

Colorado: Rocky Mountain Arsenal Exposure Study

ATSDR funded a grant to the Colorado Department of Health to measure exposure to certain pesticides, diisopropylmethylphosphonate (DIMP, a chemical unique to the U.S. Army's manufacture of nerve gas), arsenic, and mercury among populations living in three study areas located near the arsenal. The three areas were presumed, based on environmental data, to have high, intermediate, and low likelihood of human exposure to the contaminants of concern. Blood and urine specimens were obtained from a representative sample of approximately 500 persons selected from a complete door-to-door census of the study areas the investigators conducted in the fall of 1989.

In addition, questionnaire data examined the prevalence of demographic, occupational, and other potentially confounding factors. Laboratory studies are continuing at the Colorado Department of Health and Colorado State University. A final report is scheduled for release in 1992.

Idaho: The Bunker Hill Lead Exposure Study

Originally an intervention program in 1985, this study now is designed to provide continued blood lead testing of children living in the vicinity of the Bunker Hill Smelter area in Silver Valley, and to assess changing environmental situations that may import lead exposures.

The objectives of this study are to determine the current blood lead levels of 250 children, aged nine months to nine years of age, in Kellogg, Page, Smelterville, and Wardner, and to follow up on any children with blood lead levels of 25 µg/dl or greater with education and intervention.

Additionally, house dust samples have been collected in 80 residences that have undergone remediation. These samples may serve as a database for future studies exploring the relationship of yard remediation and blood lead levels. Data on Silver Valley children have been compiled for 15 years. With these data, temporal trends in blood lead data also will be analyzed.

Illinois: Volatile Organic Compounds Exposure

In this study, exposure to groundwater contaminated with volatile organic compounds (VOCs) is being evaluated in South-

east Rockford, Illinois. The groundwater contamination was discovered in 1984, and subsequent sampling showed that about two square miles of the city (about 2,500 to 5,000 persons) were affected. No source of the contamination has been identified.

The purposes of this study are to determine if blood levels of VOCs in the residents are higher than those of an unexposed population, and to conduct a questionnaire to determine whether there are correlations between blood levels and household exposures.

Samples were taken and questionnaires were administered to ten households when EPA informed them of the elevated levels. The results of the blood samples, air samples, and questionnaires are being analyzed by the Illinois Department of Public Health. A final report is expected in FY 1991.

Missouri: Serum Levels of Chlordane

ATSDR funded a grant to the Missouri Department of Health to determine exposure levels from consuming fish from selected Missouri rivers and to better quantify the risk of eating contaminated fish. The study compares the blood serum levels of chlordane and other organochlorides for an estimated 150 persons in three different groups of individuals with national reference standards from the National Health and Nutrition Examination Survey (NHANES-II, 1976-1980). Study participants eat at least one pound of channel catfish and/or carp per week from one of three sources: 1) the lower 22 miles of the Meramec River, 2) commercially caught in areas under a public health advisory, and 3) areas known to have chlordane levels well below 300 parts per billion. A final report is expected in FY 1991.

Montana: Arsenic and Lead Exposure Study

ATSDR provided technical assistance to the Butte-Silver Bow Creek City-County Health Department and the Montana Department of Health and Environmental Sciences to determine whether persons residing near the Rocker Operable Unit of the Silver Bow Creek Superfund site had higher body burdens of arsenic and lead (measured by urine arsenic and blood lead levels) than persons residing in a comparison area, and if so, to determine whether specific behaviors could be identified that were associated with increased arsenic and lead levels. A complete door-to-door census identified 306 eligible residents in the target area. A final report is expected in 1991.

*New York: Polychlorinated Biphenyl (PCB) Exposure Study
of Native American Women and Infants*

ATSDR funded a grant to the New York State Department of Health to determine the relationship between dietary exposure to PCBs and corresponding body burdens among an estimated 360 lactating women and their infants. The specific aims of the study are to: 1) determine if the concentrations of PCB congeners in breast milk and urine are greater among the Mohawk women compared with concentrations in a semi-rural control population of nursing women; 2) to correlate maternal exposure to PCBs through diet to maternal concentrations of PCB congeners in breast milk and urine; 3) to determine if the concentration of PCBs is greater in the urine of breast-fed Mohawk infants when compared with concentrations in a comparison group of infants; and 4) to compare congener patterns in human biological specimens to those identified in fish, wildlife, soil, sediment, and water.

Data collection was impeded because of violence in the area, but is continuing. A final report is scheduled for release in 1992.

Pennsylvania: Neighborhood Lead Exposure Study

ATSDR funded a grant to the Philadelphia Department of Health to conduct a lead exposure study among approximately 736 residents to characterize the distribution of blood lead levels in Lower Port Richmond and compare findings with two comparison neighborhoods.

Researchers selected participants at random from a complete neighborhood census performed by Temple University. Questionnaire data examined pathways of exposure, behavioral patterns, demographics, duration of residence, distance from the plant, and other potentially confounding factors. Data analysis was performed in collaboration with the University of Pennsylvania School of Medicine, Clinical Epidemiology Unit. The final report is expected in 1991.

Minnesota: Methylmercury Exposure Study

ATSDR concluded an interagency agreement with the Indian Health Service, Bemidji Service Area, to describe patterns of fish acquisition and ingestion among members of the Fond du Lac Band of Chippewa Indians; to measure the concentrations of total and inorganic mercury in whole blood and in hair among study participants; to determine the association between the ingestion of fish and methylmercury levels in hair and blood; and to estimate changes in mercury exposure over time during the summer

months based on laboratory tests on hair samples. Data collection will commence in the summer of 1991.

Kansas: The Galena Subsite Health and Exposure Study

ATSDR funded a grant to the Kansas Department of Health and Environment to measure evidence of biological exposure to lead and cadmium through analysis of blood and urine to: 1) determine blood lead levels for children between the ages of six and 18 years; 2) determine if there is a correlation between these blood lead levels and standardized test performance; and 3) determine to what extent behavioral, demographic, and other potentially confounding factors--including duration of residence in the Galena subsite--are correlated with lead exposure. Data collection will commence in the summer of 1991.

Illinois: Taracorp Lead Health and Exposure Study

ATSDR funded a grant to the Illinois Department of Health to conduct a lead exposure study in Granite City, Illinois. The objectives of the study are to: 1) determine blood lead levels in the target area and compare blood lead levels with state and national health guidelines; 2) determine if blood lead levels correlate with environmental lead concentrations while controlling for confounding factors; 3) determine from questionnaire analysis what factors are most important in determining individual risk for lead exposure; and 4) determine if subtle effects of lead on certain organ systems can be detected by use of medical testing. Data collection will begin in the summer of 1991.

Missouri: Jasper County Heavy Metal Health and Exposure Study

ATSDR funded a grant to the Missouri Department of Health to study biologic indicators of exposure to lead and cadmium from contaminated soil, mine tailings, and water. Because children are more likely to be exposed and are most susceptible to adverse health effects, the study will concentrate on them while also including a sample of adults. Data collection will begin in the summer of 1991.

Volatile Organic Compounds Assessment, Nesmith, SC

The purpose of this study is to evaluate the body burden of benzene which may or may not be associated with chronic nonconsumptive use of contaminated water by household mem-

bers. Peer review comments on the final report have been received, and responses to peer review comments are being developed. A final report is expected in FY 1991.

California Gulch Site, Leadville, CO

ATSDR provided funding and technical assistance to the Centers for Disease Control and the Colorado Department of Health for a study of human exposure to heavy metal contamination from the California Gulch Site. The first of two final reports of this study was published in April 1990. The second report, which is primarily an analysis of the environmental data, is expected in FY 1991.

Caldwell Systems, Inc., Lenoir, NC

In June 1990, following an ATSDR emergency consultation that was given to EPA in May, the Agency received a congressional petition request for Caldwell Systems, Inc., in Lenoir, North Carolina. As a result of that congressional petition, a study was designed to compare the prevalence of specific diseases and symptoms within a 1.5-mile radius of a hazardous waste incinerator with the prevalence in a similar comparison population and to determine if the prevalence of symptoms or diseases among former workers' family members is different from that of a comparison population. A final report is expected in FY 1992.

Puyallup Indian Reservation, WA

The purpose of this study is to evaluate concerns about cancer mortality among the Puyallup Nation of Indians residing near the Commencement Bay Superfund site. A draft report was prepared and is undergoing review. A final report is expected in FY 1991.

*New Jersey Zinc/Horsehead Resource
Development, Palmerton, PA*

In 1991, ATSDR will provide technical assistance to the Pennsylvania Department of Health to determine whether family members residing within several block distances of zinc smelters have elevated urinary levels of cadmium, elevated blood levels of lead, or other abnormal biologic effects of exposure that can be measured using a chemistry profile examination or flow cytometry technology. Data will be collected in the fall of 1991.

Epidemiology Studies*Massachusetts: Environmental Investigations*

ATSDR funded the Center for Environmental Health and Injury Control (CEHIC), CDC, in 1988 for a study to address possibly contaminated public wells in the Woburn, Massachusetts, area. The objectives of the study are to investigate the rates of selected adverse reproductive outcomes occurring between 1969 and the present for residents of Woburn, Massachusetts, and a comparison community; to establish ongoing surveillance for selected adverse reproductive outcomes in Woburn and other selected Massachusetts communities; and to assess present and past environmental contamination in Woburn and to link adverse reproductive outcomes with potential environmental exposures. The projected final report date is 1992.

New York: Early Pregnancy Detection Study

ATSDR funded CEHIC for a study to determine the rates of early pregnancy loss in the general population and determine whether early pregnancy loss technology is appropriate for population-based studies.

The study has two phases:

- o a prospective follow-up of a small group of healthy women in a controlled setting to determine the feasibility of detecting early pregnancy and early pregnancy loss; and
- o implementation of an epidemiologic field study designed to determine the feasibility of detecting early pregnancy loss in a population-based setting.

The data collection phase of the study is complete. Data analysis and the final report are scheduled for completion in 1991.

Maine: Union Chemical Site

The purpose of this study is to determine whether mortality patterns of residents of South Hope, Maine, are associated with exposure to contaminants from the Union Chemical Company. This hypothesis-generating study will determine the mortality experience of these residents when compared with 1) mortality incidence in the state of Maine, 2) incidence in another Maine county with similar socio-demographic patterns, and 3) incidence nationally.

Data collection has been completed, and analysis is progressing. A draft report on this study is expected to be available to residents in the area by 1991.

*Washington: Child Mortality Study,
ASARCO Copper Smelter Co.*

Children growing up in Ruston, Washington, before closure of the ASARCO Copper Smelter Company were exposed to some of the highest levels of ambient air arsenic found anywhere in the world. The surrounding area contains a concentrated urban population. Although it is difficult to precisely determine the number of children exposed, based on school enrollment for Ruston Elementary, an estimated 1,000 children grew up in the one-mile area around the ASARCO smelter between 1920 and 1980.

This follow-up study will compare the observed number of lung cancer deaths in males who attended Ruston Elementary School between 1920 and 1980 with such deaths in populations unexposed to arsenic. Currently, the cohort is being identified and vital statistics records will be searched to determine if differences in lung cancer deaths exist. A final report is expected in early 1992.

National Dioxin Morbidity Study

In April 1985, the National Institute for Occupational Safety and Health (NIOSH) began this dioxin morbidity and reproductive study to determine whether workers exposed to dioxin-contaminated materials experience unusual or excessive persistent morbidity.

The study involves about 100 former employees of the Syntex plant in Verona, Missouri, and about 500 former employees of the Diamond Shamrock plant in Newark, New Jersey. Methodology involves the use of questionnaires, medical examinations, and telephone interviews of wives to ascertain reproductive histories.

To date, the evaluation of the relationship between serum 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) levels and demographic and personal characteristics of study participants has been completed, an analysis of peripheral nervous system data has been completed, and analysis of pulmonary data is progressing. A final report is expected in 1993.

National Dioxin Mortality Study

In 1984, ATSDR funded NIOSH to conduct this study to determine the mortality outcome of U.S. production workers exposed to dioxin-contaminated chemicals.

The study includes approximately 7,000 workers from 14 facilities throughout the United States. The study is designed to

determine if there is an association between exposure to dioxin-contaminated products and death due to 1) soft tissue sarcoma, 2) lymphoma, 3) stomach cancer, and 4) liver cancer. ATSDR anticipates a final report in FY 1991.

New York: Study of Congenital Malformations

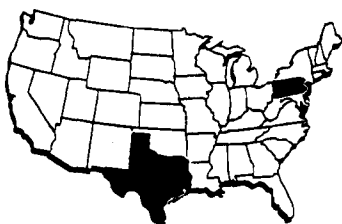
This study was funded in September 1990 and will begin early in FY 1991. A case-control design will be used to evaluate associations between possible maternal exposure to specific classes of contaminants and the risk of having a child born with congenital malformations.

Surveillance Activity

Health surveillance programs involve the periodic screening of a defined population, such as residents in a contaminated neighborhood. This screening tests for a specific disease or for biologic markers of a disease for which the population is at increased risk. The system should include a mechanism that can refer for treatment those individuals who screen positive for the disease.

In FY 1990, the Division of Health Studies designed and implemented a five-part surveillance plan for the Agency. These five types of surveillance, and studies under way in each type, are described below.

Site-Specific Surveillance



Site-specific surveillance is the systematic collection, analysis, and interpretation of health data from persons residing near hazardous waste sites. DHS developed a draft protocol that establishes criteria for selecting sites and populations for site-specific surveillance.

Texas

A grant was awarded in September 1990 to the Texas Department of Health to conduct site-specific surveillance at the Koppers site, Texarkana, Texas to study the long-term effects of exposure to polycyclic aromatic hydrocarbons (PAHs).

Pennsylvania

Through the collaborative efforts of NIOSH and the state of Pennsylvania, DHS continued support for the Drake Health Registry and continued medical surveillance of workers exposed to beta-naphthylamine.

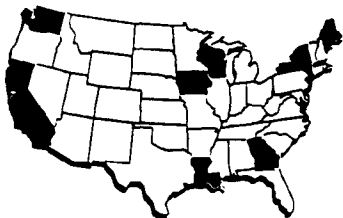
As of December 31, 1989, 267 workers had completed at least two screenings for bladder cancer. Of these, 21 had positive findings requiring further evaluation, and 31 had findings requiring monitoring. As of June 1990, three men had been identified with dysplasia (defined as precancerous cell changes), and none had been identified with tumors. Three of the 42 deceased workers died of bladder cancer.

New Jersey

In August 1990, ATSDR awarded a grant to the borough of Pitman, New Jersey, to support the residents in establishing a voluntary residence tracking system. The nearby Lipari dump site is first on the list of NPL sites.

Several health studies have been conducted on the population surrounding the Lipari site, but the results so far are inconclusive. The voluntary residence tracking system will identify present and past residents who may have been exposed to air contaminants emanating from the landfill. These persons will be given all timely and relevant information on the progress of health investigations at the site.

State-Based Surveillance



Most state health departments have or have access to a variety of health outcome and environmental databases. These databases are often collected for purposes such as mandatory registration of vital events or municipal water testing. State-based surveillance efforts link these diverse databases and attempt to anticipate and analyze any ecological correlations that may arise so that appropriate follow-up studies can be conducted.

ATSDR is supporting the following state-based surveillance projects:

California, Maine, and Wisconsin

In California, Maine, and Wisconsin, ATSDR supports the Centers for Disease Control (CDC) Chronic and Sentinel Disease Surveillance System. The departments of health in these states are developing surveillance methods for diseases of major public health impact and diseases that may be related to exposure to hazardous substances at NPL sites. This surveillance uses a variety of existing data sets, such as vital statistics, hospital discharge data, and tumor registry data, to link records and develop mapping techniques. These maps show the geographic areas with high, medium, or low rates of various health outcomes such as bladder cancer and lung cancer. The maps also identify

various levels of exposure potential for specific geographic areas by county, zip code, and other location indicators. The objectives of this surveillance are to:

- o collect and analyze morbidity and mortality data about diseases that may be wholly or partially attributable to exposure to hazardous substances in the environment; and
- o determine what can be done to prevent chronic diseases in areas where exposure to hazardous substances in the environment may lead to these chronic diseases.

Final reports from these projects will be available in early 1992.

Georgia

Since 1984, ATSDR has supported CDC surveillance of developmental disabilities and the perinatal risks of very low birthweight babies in Georgia. In addition to measuring the prevalence and incidence of developmental disabilities and low birthweight, this surveillance program collects ambient environmental data and uses epidemiologic case-control studies to determine whether environmental hazards are associated with developmental disabilities or low birthweight.

The subprojects for this activity are Developmental Disabilities of Childhood in Georgia and Perinatal Risks for Very Low Birthweight in Georgia. The objectives are to:

- o design and conduct population-based surveillance to determine the prevalence and incidence of developmental disabilities;
- o develop a database of available ambient environmental data that can be used to generate hypotheses of possible causative associations;
- o develop methods to detect associations between environmental hazards and developmental disabilities or low birthweight; and
- o conduct epidemiologic case-control studies of associations between environmental risk factors and cases identified by the surveillance system.

In addition, a surveillance program has been established to detect children--by the age of ten--with developmental disabilities in the metro Atlanta area. Parents of infants and young children meeting the case definition and selected controls will be interviewed to generate possible etiologic hypotheses that can be applied to a database of available ambient environmental data. Population subgroups will be identified through geocoding of environmental events to locate areas of high risk and determine their proximity to environmental hazards. This project is scheduled to end in 1991, and a final report is expected in early 1992.

Massachusetts

Since 1984, ATSDR has supported CDC surveillance of birthweights and environmental exposures in Massachusetts. The purpose of this project is to evaluate environmental data and the geographic pattern of birthweights from 1969 through 1984, and to identify potential exposures to hazardous substances associated with low birthweights. Time trends will be examined, as will time-space clusters of unusual birthweights. This project is scheduled to end in 1991, and a final report is expected in early 1992.

Iowa, New Jersey, and Washington

Since 1986, ATSDR has supported CDC surveillance of reproductive outcomes and environmental exposures in Iowa, New Jersey, and Washington. These projects are designed to identify unusual rates or trends of selected adverse reproductive outcomes and evaluate possible associations between these adverse outcomes and potential exposures to hazardous wastes.

Surveillance in Iowa covers approximately 40,000 births per year; in New Jersey, approximately 69,000 births; and in Washington, over 100,000 births annually. In 1991, final reports will be available from the studies in Iowa and Washington and data collection will be completed in New Jersey.

New York

Through an ATSDR supported grant to the New York Department of Health, an algorithm will be developed for setting priorities for hazardous waste sites based on the environmental hazard posed by the site and the incidence of cancer in nearby communities. The algorithm will use environmental data to estimate human exposure and cancer registry data to determine the incidence of cancer in counties with hazardous waste sites.

The outcome of this project may help set priorities for both the investigations and resources spent on hazardous waste sites. Because the data needed to run this algorithm are already collected for other purposes, using the algorithm may be a cost-efficient way to determine which hazardous waste sites pose the most significant cancer risk. This study began in late 1990.

Louisiana

This project is designed to adapt and link existing databases of health outcomes from vital statistics with environmental exposures from sources, such as public water supplies, air, and pesticides. This surveillance system will be used to explore the relationship between environmental exposure and adverse health outcomes by monitoring trends for health outcomes and environmental parameters. The grant was awarded in September 1990.

New Jersey

In August 1990, ATSDR awarded a grant to the New Jersey Department of Health to conduct an expanded study of low birthweight for communities near the Lipari Landfill. This study will build upon one already begun by the New Jersey Department of Health and will include data for the years 1965-69 and 1975-79.

Emergency Event Surveillance

DHS developed and implemented a surveillance system in five states to describe the morbidity and mortality experienced by employees, first responders, and the general public as a result of hazardous material emergencies. The five states are Colorado, Iowa, New Hampshire, Michigan, and Wisconsin. The objectives of this surveillance system are:

- o to describe the distribution of hazardous material emergencies;
- o to describe the morbidity and cause of mortality experienced by employees, responders, and the general public as a result of selected hazardous material emergencies; and
- o to analyze and describe the risk factors associated with the morbidity and mortality and develop/propose strategies to reduce subsequent morbidity and mortality when comparable events occur in the future.

**Hazardous Waste
Worker Surveillance**

ATSDR developed a protocol for conducting surveillance of hazardous waste workers and awarded a contract for conducting this surveillance to the Laborers' National Health and Safety Fund (LNHSF) of the Laborers' International Union of North America (LIUNA) in September 1990. LNHSF represents approximately 2,000 hazardous waste workers and expects that its membership will grow by 2,000 new members each year for the next five years. The contract period is for one year and includes four one-year options for extension.

The surveillance contract requires annual administration of a questionnaire to hazardous waste workers who are members of LIUNA. Data from the survey will determine the morbidity and mortality rates of these workers. Because hazardous waste workers are potentially exposed to higher concentrations of contaminants, researchers can use information gathered from this population to evaluate a range of exposures.

**Relocated Persons
Surveillance**

A protocol was developed which includes goals and objectives for surveillance of individuals permanently relocated because of potential exposure to hazardous substances. This protocol also includes definitions of permanently relocated and criteria for selection of sites and individuals. DHS is continuing to try to identify questionnaires that measure quality of life indicators.

Other Accomplishments
Report to Congress

Many small communities exist around Superfund sites. Therefore, conducting a health study that will provide definitive results regarding an exposure to a hazardous substance becomes difficult because of the sparseness of these populations.

Multi-site studies afford the researcher the opportunity to combine populations from several sites to draw more definitive conclusions between exposure and outcome. However, conducting multi-site studies is difficult. To properly conduct a multi-site study, the researcher must identify populations exposed to the same type of contaminant through the same route of exposure, and with similar demographics. Further, managing the data becomes difficult because data are collected at multiple sites. The researcher must be assured that the data were collected, entered, and analyzed in a uniform and specific manner to protect the integrity of the conclusions.

A panel of experts convened on May 3, 1990, to discuss the concept of conducting multi-site epidemiologic studies for Superfund sites. The panel considered such topics as the value

of multi-site epidemiologic studies to ATSDR in meeting Agency objectives, the feasibility and appropriate uses of multi-site studies, costs and benefits, and the identification of supporting literature. As mandated, ATSDR is preparing a report to Congress concerning the feasibility and value of performing multi-site epidemiologic studies of Superfund sites.

VIEW Database

The VIEW database system is designed to be a user-friendly environmental database prototype that allows ATSDR staff to quickly search through environmental information on NPL sites and view information of interest. ATSDR created VIEW in 1988 by extracting information from its own records and records kept by EPA and state departments of health and environmental quality. The primary objective of the system is to support decision-making in selecting sites for development of subregistries to the National Exposure Registry. The VIEW database contains more than 16,500 records with chemical-specific information on over 1,180 EPA designated NPL sites. This database also creates a readily available synopsis of relevant environmental data to the public health worker in the field.

The VIEW database will be supplanted by the ATSDR Hazardous Substance Data Management System (HAZDAT computer database) that will be online by January 1991. All data in VIEW will be transferred to the mainframe and will be incorporated into the HAZDAT system to ensure data currency and consistency of access. The HAZDAT system is discussed in detail in the section entitled Special Initiatives.

**Computer Software
(CLUSTER)**

Through a modification to the interagency agreement between ATSDR and the Department of Energy in FY 1989, the Agency has provided oversight to the development of computer software (CLUSTER) designed to provide an array of statistical tests that will assist in the investigation of rare health events. The software and user manual for CLUSTER have undergone continuous evaluation, including peer reviews and field trials, and are now ready for distribution to state health departments and other interested persons for their use in determining cluster events.

SUMMARY

The Division of Health Studies has made accomplishments toward evaluating the health effects of human exposure to hazardous substances. The development of exposure registries will facilitate the development of new scientific knowledge by

identifying and subsequently following persons exposed to a defined substance at selected sites. In addition to facilitating research, the registry activities can further serve public health by keeping the registrants informed of relevant research, medical interventions, or preventive measures related to their exposure. Further, data obtained through surveillance activity will be valuable for monitoring the occurrence of chronic diseases, occupational illness, and injuries. This information is very important for appropriate decisions regarding the planning, evaluation, or implementation of public health interventions.

Chapter Four

DIVISION OF HEALTH EDUCATION

LEGISLATIVE MANDATES

The Administrator of ATSDR is mandated by CERCLA, Section 104(i)(14), as amended by SARA, to "assemble, develop as necessary, and distribute to the states, and upon request to medical colleges, physicians, and other health professionals, appropriate educational materials (including short courses) on the medical surveillance, screening, and methods of diagnosis and treatment of injury or disease related to exposure to hazardous substances (giving priority to those listed in paragraph [2]), through such means as the Administrator of ATSDR deems appropriate."

Section 104(i)(1)(B), as amended, mandates that ATSDR establish and maintain an inventory of literature, research, and studies on the health effects of hazardous substances.

The Division of Health Education (DHE) has the primary task of implementing all educational programs related to Superfund sites. In so doing, DHE has the responsibility of identifying the appropriate target audiences for these educational programs. These audiences include national, state, and local medical associations; academic medical centers; medical schools; and schools of public health. In this chapter, we list the accomplishments DHE has made toward addressing these audiences as mandated.

HIGHLIGHTS OF DIVISION ACCOMPLISHMENTS

Case Studies in Environmental Medicine

ATSDR is mandated to provide health professionals with appropriate educational materials on the health effects and medical surveillance of persons exposed to hazardous substances. Although ATSDR toxicological profiles present baseline data on the toxicological and health effects of a particular hazardous substance, they are not intended to provide all the information a health care provider needs to properly evaluate, advise,

treat, and manage a patient exposed to a particular hazardous substance. In an effort to close this gap, in September 1988 ATSDR awarded a contract to DeLima Associates of San Rafael, California, to develop and pilot test a series of self-instructional documents called **Case Studies in Environmental Medicine**.

These monographs are written to provide primary care providers with the information they need to diagnose, treat, and monitor patients exposed to hazardous substances in the environment. Each monograph was written with the input of an expert contributor and peer-reviewed by a committee of physicians from several medical associations. The topic of each case study is a specific chemical found at a site on the NPL, or an environmentally related substance of great public health interest. Chemicals to be studied in the series are arsenic, asbestos, benzene, cadmium, chromium, cyanide, dioxins, lead, methylene chloride, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), radon, tetrachloroethylene, trichloroethylene, and vinyl chloride.



June 1990
Case Studies in Environmental Medicine



Asbestos Toxicity

Environmental ALERT . . .

- ☒ Although asbestos has been banned from use in many products, it will remain a public health concern well into the 21st century.
- ☒ Intact asbestos sources in the home release few fibers and should be left undisturbed. Damaged or crumbling materials should be repaired or removed only after receiving professional advice.
- ☒ Asbestos exposure is associated with asbestosis, mesothelioma, and lung cancer, and may cause cancer at extrathoracic sites.

The monograph is one in a series of self-instructional publications designed to increase the primary care provider's knowledge of hazardous substances in the environment and to aid in the evaluation of potentially exposed patients. The Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control (CDC) designate this continuing medical education activity for 1 credit hour in Category 1 of the Physician's Recognition Award of the American Medical Association and 0.1 continuing education units for other health professionals. See pages 21 to 23 for further information.

Guest Contributor: Raymond Demers, MD, MPH
Guest Editor: Irving J. Selikoff, MD

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 Bernard Goldstein, MD, Alan Hall, MD,
 Richard J. Jackson, MD, MPH, Jonathan Rednick, MD,
 Robert Wheeler, MS, Brian Wrenner, MD



U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
 Public Health Service
 Agency for Toxic Substances and Disease Registry

The Division of Health Education completed final drafts of four monographs: lead, radon, methylene chloride, and vinyl chloride. A dissemination plan for the monographs was submitted by the contractor to ATSDR. The key element of the plan is the publication of the monographs in a sponsored journal or magazine. In order to reach a wide physician audience, the contractor targeted the membership of primary care organizations, including:

- o the American Association of Family Physicians (AAFP);
- o the American College of Emergency Physicians (ACEP); and
- o the American Academy of Pediatrics (AAP).

A pilot-test evaluation of the case studies for lead, radon, vinyl chloride, and methylene chloride was completed. These case studies were distributed to 169 physicians attending occupational/environmental medicine workshops in California and to 157 other clinicians. Overall, respondents thought that the series is needed and that the format for the monographs is appropriate.

Continuing Medical and Education Credits

After completing the case study, participants may apply for continuing medical education (CME) credit for the American Medical Association, American College of Emergency Physicians, and American College of Family Physicians, or continuing education units (CEU) for the American Osteopathic Association.

During the pilot-test phase of the case studies, 2,000 monographs were distributed for review, CMEs were awarded to 167 physicians, and CEUs were awarded to 14 other professionals. A database has been developed to track the distribution of the case studies for continuing education, and currently there are 2,000 participants listed in the database. In addition, the case studies are used in other ATSDR programs, such as medical school curriculum development and health professional outreach for health assessment follow-up, and by state departments of health that have a cooperative agreement with ATSDR to develop programs in environmental medicine.

Published Case Studies

The case study for vinyl chloride was published in the November 1990 issue of the **Journal of Clinical Toxicology**. In addition, two other monographs on trichloroethylene and polychlorinated biphenyls will be published in this journal. Arrangements have been made with the **Journal of the American Medical Association** to publish abridged versions of the case studies. The first issue of the series, **Case Studies in Environ-**

mental Medicine: Lead Toxicity, is now in print, with 38,000 copies available for distribution. In January 1991, 30,000 copies will be distributed to members of the AAP.

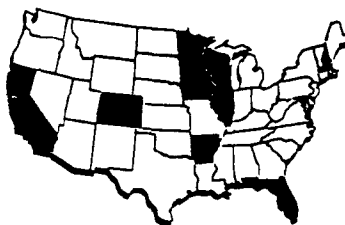
**Case Studies
in Progress**

A contract to develop 15 new case studies and 25 emergency response protocols was awarded to DeLima Associates. This set of monographs will include ten on specific chemicals and five on special topics. Some of the chemicals included for study are beryllium, chloroform, mercury, methanol, and toluene. The special topics will include monographs that discuss:

- o how to take an exposure history and communicate risks to the patient;
- o rash and skin reactions to hazardous substances; and
- o multiple chemical sensitivity.

Final drafts for the first five case studies in this series are scheduled to be available in the summer of 1991.

Cooperative Agreements



In September 1989, the Division of Health Education awarded cooperative agreements to 11 states to support educational activities for physicians and other health professionals concerning human exposure to hazardous substances in the environment. The states receiving the initial awards were: Arkansas, California, Colorado, Florida, Illinois, Iowa, Maryland, Massachusetts, Minnesota, New Hampshire and Wisconsin.

The intent of the program is to:

- o enhance the development, implementation, and evaluation of educational materials or methods to improve the skills and knowledge of health care providers concerning exposure to hazardous substances;
- o promote the development of educational activities for health care professionals and demonstrate their effectiveness;
- o develop materials or methods to be used by health care providers in communicating and counseling patients about risks from exposure to hazardous substances in the environment;

- o promote the development of methods or materials to improve the knowledge and skills of health care providers in taking an "environmental exposure history" as an integral part of their patient work-up; and
- o demonstrate the use of effective resources to provide health care professionals with information on hazardous substances

State health and environment departments receiving the awards are developing appropriate educational materials on medical surveillance, screening, and methods of diagnosis and treatment of injury or disease related to exposure to hazardous substances found in the nonworkplace environment. The awardees are using a variety of approaches including short courses, case studies, resource manuals, grand rounds presentations, and conferences.

In September 1990, the original states were renewed, and the following new states were added to the program: Connecticut, Georgia, Kansas, Kentucky, Maine, Missouri, New York, and Rhode Island.

To date, over 2,400 physicians and other health professionals have participated in the state-based educational programs and over 4,500 contact hours of training activity have been provided. The Division of Health Education is developing a tracking mechanism to record the number of activities being conducted, and the numbers and types of health professionals being reached (see Figure 6).

Health Professionals Trained In 1990 Through DHE Programs	
Program	Number Trained
NACHO	300
ASTHO	110
Cooperative Agreement States	2100
AOEC Network	1200
Professional Societies	750
Navy	250
Other	105
TOTAL	4815
Personnel Trained	
Physicians	2792
Other Health Professionals	2023
TOTAL	4815

Figure 6

In order to build capacity and develop a nationwide network of state health departments concerned with educating health professionals about environmental medicine, monthly conference calls are conducted with all awardees. The awardees are brought together annually to develop skills and materials to promote better implementation of this program.

Annual Workshops

The Division of Health Education conducted a workshop for the recipients of cooperative agreements to provide additional information and training, and to encourage the states to share their experiences and materials. Topics covered included program planning and evaluation, environmental exposure histories, coordination with other organizations and resources, and risk communication.

Progress Report

Many of the projects have coordinated their efforts with other existing networks in their states. For example, the Florida project incorporated their educational session on the Public Health Implications of Environmental Toxicants into a short course being given at the National Association of County Health Officials' (NACHO) annual meeting held in their state. The Massachusetts project has drawn upon resources at local clinics in the Association of Occupational and Environmental Clinics (AOEC) to conduct their physician education activities. The Arkansas project has made use of the Area Health Education Centers throughout the state as a vehicle for reaching physicians statewide. The Minnesota project coordinated efforts with the National Institute for Occupational Safety and Health's local Educational Resource Center to conduct a workshop on Environmental Issues in Primary Care. The Division of Health Education has continued to encourage and facilitate these types of interactions with other programs and resources.

Some of the projects have interacted with state personnel conducting health assessments under cooperative agreement with ATSDR. For example, the Massachusetts physician education staff have been working very closely with the health assessments staff to present site-specific information to physicians in the vicinity of a Superfund site. The Wisconsin project staff also conduct health assessments, and the project incorporates the site-specific information into printed resources being distributed to health professionals throughout the state. It is anticipated that this type of interaction and cooperation between programs will increase as the projects progress.

NACHO Short Courses

A cooperative agreement was awarded to the National Association of County Health Officials (NACHO) to develop short courses to educate health professionals about the surveillance,

diagnosis, and treatment of persons exposed to hazardous substances. As part of the cooperative agreement with ATSDR, NACHO developed and implemented short course instructional sessions and supporting materials for public health professionals on surveillance, screening, and methods of diagnosis and treatment of injury or disease related to exposure to hazardous materials.

In addition, NACHO identified 1) community health communication, 2) clinical epidemiology and environmental toxicology, 3) emergency response, and 4) special topics (childhood lead poisoning) as four initial areas of need. A series of 4-hour modules were developed and implemented at four national health professional meetings, one national county official meeting, and two regional environmental health meetings.

NACHO has sponsored three conferences and several educational sessions on environmental health issues, and has published the **National Profile of Local Health Departments: An Overview of the National Local Public Health System** and other information on environmental issues and health in its newsletter.

Immune Biomarkers Demonstration Project

In collaboration with CDC, ATSDR funded a cooperative agreement with the Association of Occupational and Environmental Clinics (AOEC) to evaluate the validity and usefulness of a screening panel for immune system biomarkers. The screening panel will consist of standard immunological laboratory tests (flow cytometry) to examine lymphocytes and measure cell-type ratios.

AOEC oversees the Immune Biomarkers Demonstration Project. This project is a joint effort of DHE and the Division of Health Studies. Phase I of the project included the installation of hardware and software at four clinical laboratories:

- o the National Jewish Center for Immunology and Respiratory Medicine in Denver, Colorado;
- o the Robert Wood Johnson Medical School and Rutgers University in Piscataway, New Jersey;
- o Johns Hopkins University in Baltimore, Maryland; and
- o George Washington University in Washington, D.C.

Phases II through V will involve training staff at participating clinical and laboratory sites, implementing standardization trials,

and evaluating the project for peer review. The project is expected to be completed in early July 1991.

Clinical Fellowship Program in Environmental Medicine

The Division initiated this program to provide for one year of stipend support (renewable for one additional year) for fellows to engage in applied environmentally related clinical research that helps prevent or mitigate the adverse human health effects and diminished quality of life that may result from exposure to hazardous substances (chemicals) in the nonworkplace environment. The program is designed to stimulate complete research projects of pilot-level research projects that may lead to further research supported by other mechanisms.

Candidates must have received the MD degree from an accredited institution and must be board-eligible in a clinical specialty with one year or more of additional training in occupational medicine and/or clinical (environmental) toxicology.

The proposed environmentally related research must encompass biomedical, epidemiological, clinical, or behavioral applied research and offer an opportunity for trainees to broaden their scientific background. Each candidate must have a mentor-sponsor who is an active participant in the area of the proposed research activity. Suggested areas include:

- Human Exposure Studies
- Health Education Methods Research
- Cluster Investigations
- Health Communication Research
- Ethics and Legal Implications Studies
- Symptom- and Disease-Prevalence Studies
- Environmental Epidemiology Studies
- Emergency Response Protocol Studies
- Environmental Surveillance Studies
- Toxicology Studies

The Division has eight clinical Fellows at the following institutions:

- University of Massachusetts Medical Center
- Massachusetts Respiratory Hospital
- University of California at San Francisco
- Mount Sinai School of Medicine
- University of Texas Health Science Center at San Antonio
- University of Washington Harborview Medical Center

Education and Training

TOXNET Training

The Division has continued to actively support and promote access to the TOXNET Computer Library. Future plans to increase TOXNET training include the development of an advanced instructor training session for employees of the states with health assessment cooperative agreements.

TOXNET is a computerized network of toxicological information relevant to the substances commonly found at hazardous waste sites on the NPL. Training has been directed toward:

- o State and Territorial Health Departments;
- o Association of Occupational and Environmental Clinics;
- o Association of Minority Health Professions Schools;
- o American Association of Poison Control Centers; and
- o ATSDR personnel.

Program Assessment of TOXNET

The Research Triangle Institute (RTI) was contracted to prepare a program assessment of the TOXNET computer system. RTI completed the first phase of the assessment by preparing a report and program assessment model that:

- o briefly summarizes the history and development of the TOXNET computer system;
- o documents and clarifies the current goals and the specific activities designed to meet those goals; and
- o discusses the likelihood that the program activities will achieve the intended goals and effects.

RTI also began second-phase activities involving unstructured interviews with TOXNET users. A list of users to be interviewed was finalized, the interview guidelines were field-tested in a focus group of users at RTI headquarters, and a second focus group of TOXNET users was held. The third phase, preparation of the final report, was begun and delivery is anticipated during the first quarter of FY 1991.

Evaluation of Hazardous Waste Education and Training

ATSDR, the Health Resources and Services Administration (HRSA), and Wayne State University cosponsored a study of hazardous waste management education and training programs in the United States. This study was completed during the fourth quarter of FY 1990, and the following findings were reported:

- o 208 schools provide some form of education and/or training in hazardous waste management;
- o 167 colleges and universities offer at least one formal credit course in hazardous waste management;
- o 89 schools have noncredit training courses in hazardous waste management;
- o New Jersey Institute of Technology, Tufts University, the University of San Francisco, and Wayne State University offer a master's program in hazardous waste management;
- o 13 schools offer a graduate-level option in hazardous waste management;
- o most hazardous waste management training is delivered through noncredit, continuing education short courses; and
- o 675 distinct short courses exist.

With this comprehensive analysis of existing programs and input from the project advisory panel, a prototype curriculum for a Master of Science in Hazardous Waste and Materials Management was developed. This model program contains 18 credits of core courses (such as chemical fate and transport, health, laboratory or field experience, law, program management, public issues, and waste management technology) and 18 credits from one of seven elective tracks (administrative policy and regulatory affairs, emergency response, engineering, health and environment, international environmental affairs, law and regulation, and management and business).

An electronic bulletin board was designed and developed by the contractor to support public access to the project database through HRSA, and to ensure that this prototype has the broadest possible impact.

Areas Closed to the Public

ATSDR, through a cooperative agreement with the National Governors' Association (NGA), biennially conducts a survey of sites closed or restricted to the public because of contamination by toxic substances. The report of the 1989 survey, which was published in 1990, is called **Restrictions Imposed on Contaminated Sites: A Status of State Actions** and describes the

affected environmental media, types of contaminants, and nature of restrictions at 1,705 sites nationwide.

The survey found that site restrictions most often pertained to groundwater use, particularly for drinking water supplies; three-quarters of the sites were contaminated by organic chemicals; and both environmental and health agencies had extensive authorities to investigate and impose restrictions at contaminated sites.

According to the survey report, environmental or combined environmental/health agencies have the most extensive authority to identify, restrict, and remediate contaminated sites. However, the survey responses indicated that health agencies have primary responsibility for assessing the exposure potential for populations near the sites and for conducting epidemiologic studies. This responsibility probably will continue to grow as health agencies conduct health assessments for all NPL sites, as required by the 1986 Superfund amendments.

SUMMARY

The Division of Health Education uses a multidisciplinary approach and makes use of contracts, grants, and cooperative agreements in developing and implementing its health education programs. Strategies include developing curricula with medical schools, producing educational materials that encourage the use of ATSDR-developed material such as the toxicological profiles, and working with state health departments to develop programs that help health professionals diagnose and treat patients exposed to hazardous substances in the environment. DHE plans for the future include greater visibility at major medical meetings to expand its educational information user base, development of user-friendly computer systems for health professionals, and outreach to nontraditional health educational mechanisms (e.g., community hospital associations, local medical societies, associations of nurses and pharmacists, established federal educational networks, and media and science writers).

Chapter Five

SPECIAL INITIATIVES AND ADMINISTRATIVE PROCEDURES

During FY 1989, ATSDR underwent a reorganization to encompass changes in the functional statements of each administrative office. In FY 1990 each office began to incorporate these changes into its daily operations. The various administrative offices and divisions have taken the lead in special projects to support the Agency's overall mission.

Hazardous Substance Data Management System (HAZDAT)

A major thrust of Agency activity during this reporting period was geared toward developing a management information system that would allow the Agency to locate information on the release of hazardous substances into the environment, and ascertain the effects of hazardous substances on health with improved uniformity, efficiency, and precision.

The development of the Hazardous Substance Data Management System (HAZDAT) is the result of an Agency-wide collaborative effort. Plans for HAZDAT began several years ago with single-user databases that were unique to individual ATSDR activities. These individual databases served as prototypes that identified system requirements for a multi-user database across the Agency. The system will be used by ATSDR to identify patterns of release of hazardous substances and to facilitate the development and creation of health studies. It will also expand the capacity for information sharing between divisions and offices within the Agency. These expanded capacities will facilitate more uniform collection of protocols and, subsequently, result in final products that are more timely, accurate, and complete.

HAZDAT is a scientific and administrative database designed to manage data collection, retrieval, analysis, and utilization through the more sophisticated technologies provided by comput-

erization. Through HAZDAT, ATSDR will be able to conduct highly sophisticated analyses on the voluminous data that it collects. More specifically, HAZDAT will be used to:

- o identify sites for health studies, surveillance, and registries;
- o aid in establishing Agency priorities;
- o track activities and program milestones;
- o identify similarities of sites and events;
- o provide an accurate and complete site history for further follow-up;
- o provide technical support to Agency staff on health concerns; and
- o provide the necessary database for Congressional Reports.

HAZDAT Data Fields

HAZDAT source documents include environmental data and health data contained in Agency products such as health assessments, health consultations, toxicological profiles, and EPA site characterization documents. Data fields included in the HAZDAT system are 1) site characteristics; 2) activities and site events; 3) contaminants found; 4) contaminant media; 5) maximum concentration; 6) population affected; 7) community health concerns; 8) ATSDR public health threat categories; 9) ATSDR recommendations; 10) environmental fate of hazardous substances; 11) exposure routes, and 12) physical hazards at the location.

In addition, HAZDAT contains data from the EPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database, which includes the following data fields: 1) CERCLIS number; 2) site name; 3) site address; 4) NPL status; 5) site description; 6) latitude and longitude; 7) operable units; and 8) general site information.

HAZDAT Users

HAZDAT will enable the Agency to share more data with its many constituencies, as well as other public and private agencies. However, use of the system is currently limited to ATSDR personnel. The Division of Toxicology will utilize HAZDAT to assist in the reranking of the 250 most hazardous substances to reflect changes and improvements in the sources of data since publication of the first list in April 1987. HAZDAT will provide extensive information for the reranking including:

- o ranking by frequency of hazardous substance occurrence at NPL sites or in emergency response situations;
- o the actual or potential exposure of human populations to substances at these sites; and
- o the numbers of people actually or potentially exposed.

Automation of this critical information will enhance multiple site epidemiologic studies and allow identification of sites that should have the highest health priority. The system also provides a mechanism for identifying substances that are of highest concern to the Superfund program and for which toxicological profiles should be prepared. ATSDR is working with EPA to find ways to share and integrate our respective databases to facilitate optimum use by both agencies. Other federal agencies are potential users, as well as state and local agencies, the scientific community, and the American public.

Federal Facilities

Health Assessment Activity at Federal Facilities

In its 1989 Report to Congress, the EPA listed 1,268 federal facility sites on the Hazardous Waste Compliance Docket. Of these, 117 have been included on the NPL. NPL sites, which are dispersed throughout 39 states and Puerto Rico, include 96 Department of Defense (DOD) sites, 17 Department of Energy (DOE) sites, two Department of Transportation (DOT) sites, two Department of the Interior (DOI) sites, and one Small Business Administration (SBA) site.

ATSDR has signed a Memorandum of Understanding with DOD and interagency agreements with the relevant component agencies (Department of the Army, Department of the Navy, Department of the Air Force, and Defense Logistics Agency) to perform health assessments and related activities at NPL sites, and to prepare toxicological profiles. The Agency has signed a Memorandum of Understanding with DOE and is developing eight interagency agreements with its various operations offices. ATSDR also anticipates signing an Interagency Agreement with DOE headquarters. These should be completed in FY 1991.

In addition, negotiations are under way with DOI which will lead to the development of two interagency agreements. Interagency agreements also are being developed with the Federal Railroad Administration and the Federal Aviation Administration under DOT, as well as with SBA.

ATSDR will conduct site visits of the 96 DOD sites in 1991, and 17 DOE sites in 1992, to rank the sites for the performance

of health assessments. Further, the Agency plans to initiate 16 health assessments in 1991, and 40 in 1992. Nine new toxicological profiles will be developed from a list of chemicals provided by DOD. Finally, the Agency will sponsor three conferences on training in risk and health assessment for the Department of the Air Force. Other health-related activities will be identified during the preparation of health assessments and health consultations.

**Future Health Assessment
Plans at Federal Facilities**

In 1990, the New England Law Conservation Foundation brought a lawsuit against the EPA because of its failure to assess all federal facility sites on the Hazardous Waste Compliance Docket. Of the 20% which have been assessed, approximately 50% were included on the NPL. As part of the settlement of the lawsuit, EPA agreed to assess the remaining federal facility sites. Based on previous numbers, ATSDR anticipates that approximately 600 federal facility sites will be added to the NPL.

With the expected future closure of DOD bases, both nationally and internationally, additional sites will be identified for health assessment activities. Additionally, as other domestic sites are identified, health assessments will be conducted.

Minority Health Initiative

In 1984, the Secretary of the Department of Health and Human Services (DHHS) established a task force to investigate the continuing disparity in the burden of death and illness experienced by blacks and other racial and ethnic minorities compared with that of nonminorities. The report resulting from that investigation, **Report of the Secretary's Task Force on Black and Minority Health**, included recommendations for a coordinated DHHS effort to address the disparity in health status between minority and nonminority populations.

This report was prepared when ATSDR was in its infancy and preceded some of the strongest hazardous substance laws in the nation, including the Superfund Amendments and Reauthorization Act of 1986. It does not directly address issues surrounding hazardous substances as they relate to minority health, or mention ATSDR. However, the report is clear in urging vigorous action by all DHHS entities in identifying, evaluating, and resolving minority health problems, wherever possible.

Reducing the disparity in key health indicators among certain subgroups is beyond the scope of ATSDR's mission. However, the Agency is committed to serve as the lead federal agency in discerning the public health implications of hazardous waste sites, wherever they exist. Consequently, ATSDR has established a Minority Environmental Health Program (MEHP) Initiative that specifically addresses hazardous waste issues.

The MEHP Initiative is an integral part of ATSDR health assessment, health studies, health education, and toxicological programs. There are three main areas of emphasis to MEHP:

- o demographic analysis;
- o health perspectives; and
- o health communications.

These areas are directly in concert with the recommendations of the Task Force to improve data acquisition, research, and health information dissemination and education programs with regard to minorities.

National Minority Health Conference

Under the aegis of MEHP, ATSDR sponsored its first National Minority Health Conference in Atlanta, in December 1990. The purpose of the conference was to advance scientific knowledge of minority health issues associated with hazardous substances and to identify the research and informational needs of environmental health professionals. More than 300 health professionals attended the conference and provided information valuable to ATSDR in responding to the health concerns particular to minorities living and working near hazardous waste sites.

Conference participants identified priority issues for health professionals to address when working with minority communities. Key action items included lead abatement procedures and the need to involve the public in addressing environmental health issues.

A workshop of health professionals will convene in FY 1991 to continue consideration of environmental issues of unique concern to minority communities.

Plan to Strengthen Public Health

The overall health goal in the United States is to assure each American the full opportunity to be healthy, to be free from illness, injury, and premature death, and to enjoy a better quality of life. The Plan to Strengthen Public Health, therefore, is an attempt to review the future roles that official health agencies and academic health centers can and should play in public health and preventive medicine. This plan outlines actions to strengthen the capacity of the public health system to meet health care demands over the next decade.

In response to the National Academy of Sciences/Institute of Medicine Report entitled, **The Future of Public Health**, the

Office of Policy and External Affairs (OPEA) has played a significant role in devising a plan to conceptualize the ideas presented in this document. During this reporting period, a series of meetings were held between OPEA staff and each of the Division Directors to begin the implementation and tracking of the respective activities that make up the ATSDR actions for the **Plan to Improve Public Health in the United States**.

Year 2000 Health Objectives

OPEA staff have participated extensively in the pursuit of the Year 2000 Health Objectives. These objectives grew out of a public health strategy initiated in 1979 with the publication of **Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention** and expanded with publication in 1980 of **Promoting Health/Preventing Disease: Objectives for the Nation**, which set out an agenda for the ten years leading up to 1990.

OPEA staff have been involved in the development of **Healthy People 2000: National Health Promotion and Disease Prevention Objectives**. This document attempts to develop a national strategy for significantly improving the health of the nation over the coming decade. This report frames the elements of an ongoing health initiative from the perspective of the potential to prevent unnecessary disease and disability and to achieve a better quality of life for all Americans.

ATSDR's contribution to this publication includes a chapter on Environmental Health. The environmental health priority area included in this publication points to improvements in the way the nation responds to factors related to the environment that are thought to have the greatest potential for preventing damage to human health. With assistance from the Division of Toxicology, OPEA provided information concerning a number of substances that will likely be included in the narrative for the objectives which involve toxic substances.

International Health Activities

International health issues have been a long-standing concern of the Public Health Service. Recognizing the opportunities and potential benefit to Superfund programs through international research and exchange of information, ATSDR continued to enhance its worldwide contacts.

During this reporting period, the Agency entered into a Memorandum of Understanding with the Pan American Health

Organization (PAHO) of the World Health Organization as a means of collaborating on environmental public health program areas pertaining to hazardous substances of mutual interest and concern. In addition to mutual participation of technical and scientific personnel in symposia and conferences dealing with hazardous substances, key elements of the collaborative efforts are:

- o technical assistance on matters relating to hazardous substances through PAHO to individual member countries;
- o PAHO identification of applied research data relevant to the statutory responsibilities of the Agency; and
- o training in the use of selected Agency materials to enable PAHO member countries to establish the necessary infrastructure to continue the transfer of technology.

The Agency also entered into a Memorandum of Understanding with the International Programme on Chemical Safety (IPCS) of the World Health Organization. Key elements of the collaborative arrangement with the IPCS include:

- o providing IPCS with the list of priority hazardous substances as the lists are developed in cooperation with the U.S. Environmental Protection Agency;
- o providing toxicological profiles developed by the Agency under CERCLA to IPCS in draft form and when available in final form;
- o providing to IPCS materials developed by the Agency for use by primary care physicians, medical educators, and other health care providers in response to public health effects of hazardous substances; and
- o where appropriate, providing consultation to the IPCS on matters of mutual concern.

National Academy of Sciences Studies

Biomarker Exposure Studies

In September 1987 the National Research Council (NRC), the National Academy of Sciences (NAS), and ATSDR formed a five-year cooperative agreement to further the scientific and technical foundations of environmental sciences and public health. Opera-

tionally, the agreement is between ATSDR and the joint NAS-NRC Board on Environmental Studies and Toxicology (BEST).

The objective of this collaboration is to allow the three organizations to work together to produce fundamental advances in the fields of environmental health and toxicology through public meetings, scientific symposia, workshops, and long-term committee inquiries into specific scientific and technical questions selected by both BEST and ATSDR. A major thrust of the agreement is the identification of biologic markers that could be employed by ATSDR in fulfilling its mandates in both health assessment and public health follow-up of people exposed to hazardous substances stemming from hazardous waste sites and spontaneous releases of hazardous substances into the environment. Through this agreement, a conceptual framework for the use of biologic markers in toxicology and environmental health has been established, and specific biologic systems have been identified for detailed scrutiny by expert committees in these areas. The status of progress in this area is described below.

Biologic Markers in Reproductive Toxicology: The findings of this report clarify concepts and definitions of biologic markers in reproductive toxicology, propose guidelines for the validation of methods, assess the significance of biologic markers in these areas, examine the potential use of biologic markers in environmental health studies, demonstrate the benefits from their use in reproductive and neurodevelopmental research, and recommend future research. This report was published September 21, 1989.

Biologic Markers in Pulmonary Toxicology: In this report researchers explain the concepts and definitions of biologic markers of pulmonary toxicology, propose guidelines for the validation of these markers, assess the significance of biologic markers in these areas, recommend areas of future research, and review existing specimen banks for prospective and retrospective analysis relevant to pulmonary toxicology. Focusing primarily on the respiratory tract as an entryway for airborne pollutants, the report reviews new ways of measuring markers, the need for markers to indicate dose or exposure levels, noninvasive respiratory function tests for use with healthy humans to detect sensitivity to inhaled pollutants, and approaches to evaluating markers at the cellular and biochemical level. This report was published September 21, 1989.

Biologic Markers in Immunotoxicology: Researchers are conducting this study to identify and evaluate currently available markers, promising new technologies for the identification of new markers, important research opportunities, and needed research initiatives in the area of immunotoxicology as they relate to

environmental health research. This report is scheduled for publication in March 1991.

Biologic Markers in Urinary Tract Toxicology: This study examines potential biologic markers of kidney and bladder pathology associated with exposure to hazardous substances. The research focuses on markers of exposure and effect, and considers markers of susceptibility where they relate to exposure and effect. The study is intended to assist research efforts and practical applications for biologic markers as early biochemical or function indicators of toxicant exposure, effects, or susceptibility. A report on this study is scheduled for publication in 1992.

Additional Studies

The following are brief summaries of other projects now in progress or already completed under the BEST cooperative agreement:

Symposium: Frontiers in Assessing Human Exposures to Environmental Toxicants, May 16-17, 1990: At this symposium, investigators summarized and discussed the newest work in detecting and assessing environmental exposures to potentially hazardous substances, including practical applications, policy implications, and research needs. A summary of the symposium is being prepared for dissemination to members of Congress and their staffs and to the environmental public health community. Proceedings from the symposium are scheduled for publication in February 1991.

Advances in Assessing Human Exposure to Airborne Pollutants: The objectives of this study are to examine new instruments, methods, and models developed in pollution-related research, occupational medicine, and other disciplines over the past 10-15 years, and to focus on how these exposure assessment tools can be used to improve characterizations of individual exposure to airborne hazardous substances. This study is scheduled for publication in January 1991.

Opportunities in Applied Research and Development: ATSDR initiated this project to evaluate priorities among environmental problems, critical gaps in knowledge and methodology, opportunities for advancing the state of science, and capabilities for pursuing such opportunities productively. A report on this project is scheduled for publication in January 1991.

Animals as Monitors of Environmental Hazards: Researchers are conducting this study to evaluate veterinary programs which monitor fish and wildlife in their natural habitat. These could then serve as alternatives, or supplements, to classical animal studies which estimate the risk to humans from environmental hazards. A report on this study is scheduled for publication in February 1991.

Neurotoxicology and Models for Assessing Risk: This study will assess the biologic bases of neurotoxicity relative to establishing underlying principles of neurotoxicity associated with risk assessment and extrapolations across species. Further, it will review existing models and other indicators of neurotoxic action and disease with respect to their efficacy in identifying neurotoxicants from environmental, occupational, and other potential sources. It also will develop critical hypotheses for future research in neurotoxicology. A report on this study is scheduled for publication in March 1991.

Measuring Lead Exposure in Critical Populations: The objective of this study is to identify and evaluate methods for measuring lead exposures. It will emphasize the evaluation of those analytic methods used for detecting and measuring lead below 25 µg/dl in young children, pregnant women, and other populations at risk. A report on this study is scheduled for publication in March 1991.

Animal and Human Lead Epidemiologic Studies (The Maryland Lead Study): ATSDR funded a grant to the Maryland Department of the Environment to develop biomarkers of low-level lead exposure in animals. These biomarkers will then be used to detect exposure in humans associated with blood lead levels in the range of 5-25 µg/dl. Investigative work is now under way at the University of Maryland. This study is scheduled for completion in 1992.

Volatile Organic Compounds and Phenols Study (NHANES): Since 1988, ATSDR has funded a study at the Center for Environmental Health and Injury Control, CDC, to develop the methodology to determine reference ranges for 38 volatile organic compounds (VOCs) and 11 phenols (primarily metabolites of pesticides and 2-DDDD) in the general U.S. population. Researchers are collecting 1,000 blood samples and 1,000 urine samples for use in the study as part of the ongoing National Health and Nutrition Examination Survey III (NHANES). Samples are collected from populations across the United States and will provide a comparison population for future studies of exposure to these substances. Researchers have collected half of the total number of samples needed for the study and have begun sample analysis. A report of the findings is expected in 1992.

ATSDR Peer Review Policy and Procedures

In FY 1989, the ATSDR Board of Scientific Counselors (BSC) suggested that ATSDR make its peer review process more formal and more rigorous. ATSDR responded to this suggestion by revising its peer review policy and procedures in FY 1990.

All protocols, studies, and results of research that are carried out or funded in whole or in part by ATSDR are peer reviewed. In addition, studies that have not previously been peer reviewed that are intended to be used in the ATSDR toxicological profiles are now peer reviewed. Studies and research are directed by the responsible ATSDR division; however, peer review is the responsibility of the Associate Administrator for Science in the Office of the Assistant Administrator.

In FY 1990, a **Federal Register** notice requested that scientific experts in the fields of biostatistics, environmental health, epidemiology, internal medicine, pediatrics, public health, reproductive health, and toxicology submit their names and curricula vitae to be considered as peer reviewers. Approximately 175 persons responded. Each was sent a copy of ATSDR's Peer Review Policy, Peer Review Procedures, and a conflict-of-interest form. A conflict-of-interest form is completed by each peer reviewer for each peer review.

By the end of FY 1990, several protocols were being reviewed under the revised procedures.

SUMMARY

During FY 1990, the Agency accomplished many goals and began to set in place mechanisms for establishing and achieving future goals. The special initiatives and administrative procedures detailed in this chapter are a continuation of activities begun in earlier years to improve our knowledge of environmental health. The programs initiated by ATSDR focus on a wide array of environmental concerns, which include site-specific information, substance-specific information, and medical education. By implementing these programs, ATSDR is building the infrastructure necessary to fulfill its mission. These achievements, coupled with a strong commitment to improve environmental health related to hazardous substances, have enabled ATSDR to continue to meet its established mandates.

Appendices

SPI-06396

Appendix A

ATSDR GOALS AND OBJECTIVES

Goal 1 Identify adverse human health outcomes potentially related to the release of hazardous substances.

Objectives:

- o Through the conduct of health assessments and consultations, identify indications of adverse health outcomes related to specific sites and facilities.
- o Develop the list of priority adverse human health outcomes of relevance to Superfund and implement an ATSDR surveillance program that identifies potential patterns between adverse human health outcomes and exposure to hazardous substances.
- o Establish a national registry, composed of select subregistries, of persons exposed to priority hazardous substances and determine the feasibility of developing a national disease registry of persons with serious illnesses or diseases of relevance to Superfund.
- o Conduct health studies on select human populations, including children, at presumed risk of developing disease or acute illness from contact with hazardous substances.
- o Develop databases to identify environmental disease.

Goal 2: Determine relationships between identified adverse human health outcomes and hazardous substances.

Objectives:

- o Establish relationships between environmental contamination and human exposure to hazardous substances.
- o Investigate the relationships between identified health outcomes and elevated indices of uptake of hazardous substances.
- o Develop, establish, conduct, and evaluate an ATSDR applied research plan in support of health assessments.

Goal 3: Implement public health strategies to prevent or mitigate adverse human health outcomes related to hazardous substances.

Objectives

- o Identify through ATSDR Health Assessments, Consultations, and Health Studies those human populations where reductions in exposure to hazardous substances can be achieved.
- o Implement training, education, and communication activities and strategies for health professionals and the public to improve their abilities to prevent or mitigate adverse human health outcomes related to hazardous substance exposure.
- o Build or enhance the capacities of State and local health agencies to identify, reduce, or prevent exposure to hazardous substances.
- o Improve the ability of primary care health professionals to identify, treat, and report acute illness and chronic disease in persons exposed to hazardous substances.

Goal 4: Implement the infrastructure necessary to accomplish the ATSDR mission.

Objectives

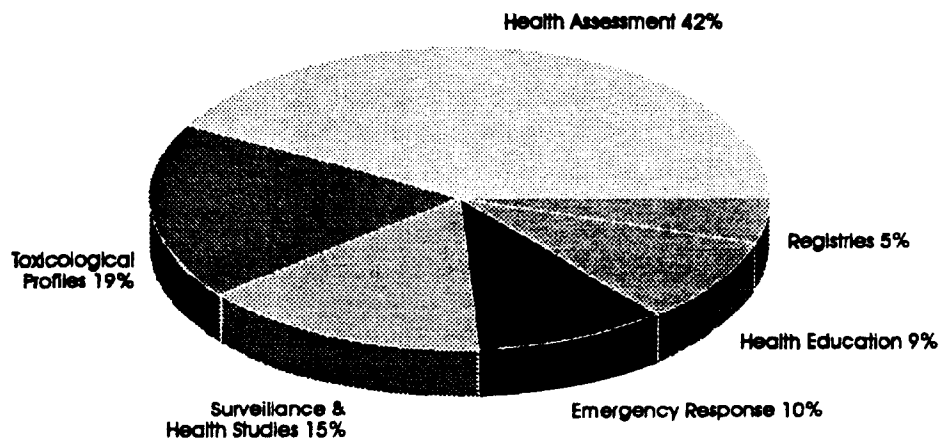
- o Promote the Agency's performance of its mission.
- o Ensure the quality, quantity, timeliness, and scope of ATSDR's programs.
- o Implement the Agency's legislative mandates.
- o Ensure effective management of ATSDR programs.
- o Enhance participation of women and minorities in ATSDR's programs and activities.
- o Recruit, develop, and retain quality staff throughout the Agency.
- o Develop and maintain integrated management information systems.

Appendix B

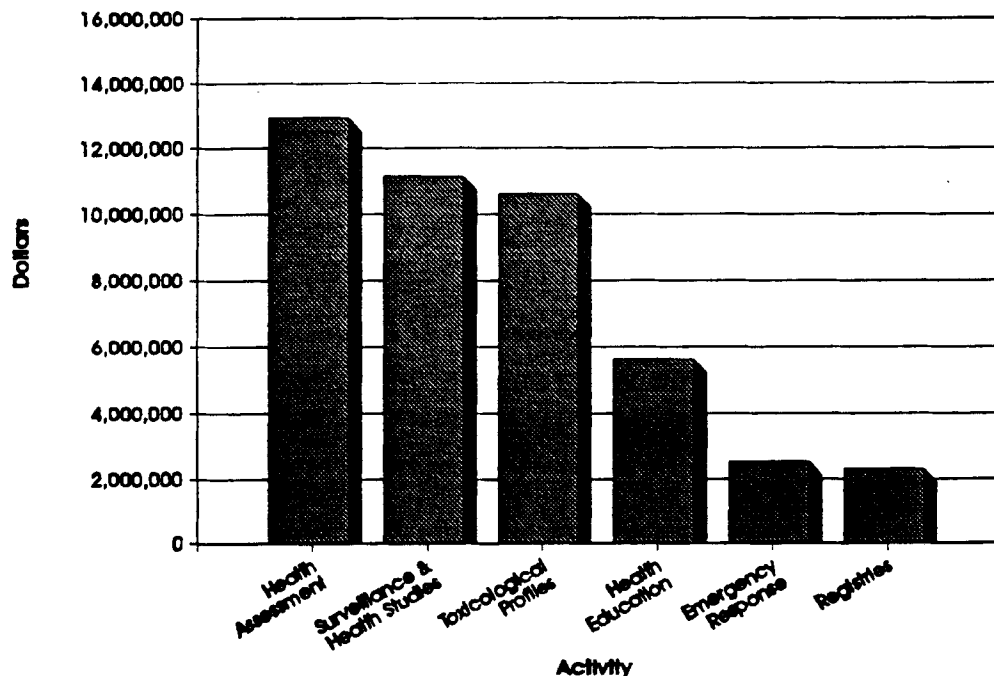
ATSDR BUDGET AND PERSONNEL BREAKDOWN

In FY 1990 the full-time-equivalent ceiling was 255 personnel. Twenty-four (24) FTEs were assigned to the Centers for Disease Control.

FY 1990 Full Time Equivalents (FTEs) by Activity



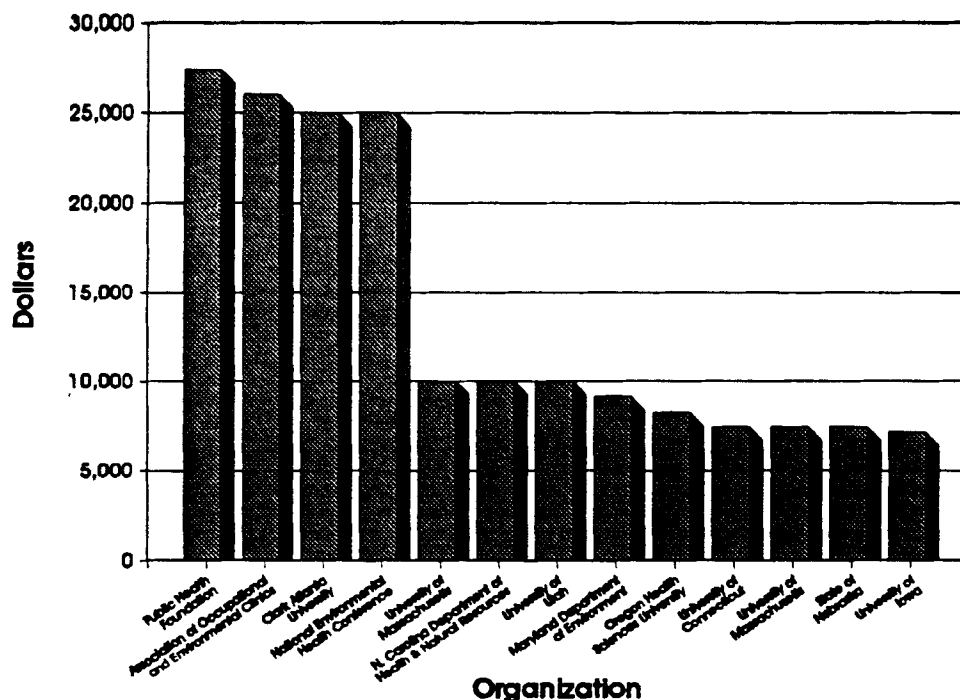
FY 1990 Budget by Activity



The budget for ATSDR in FY 1990 totaled \$45,178,700. The above graph illustrates how this budget was apportioned by ATSDR activities.

Registries	2,291,709.00
Emergency Response	2,516,747.00
Health Assessment	12,931,447.00
Toxicological Profiles	10,639,887.00
Health Education	5,625,212.00
Surveillance and Health Studies	11,173,693.00
Total FY 1990 Obligations	45,178,695.00

Conference Support Grant Mechanism



Through ATSDR's Conference Support Grant Mechanism, partial support was awarded to the following organizations:

Oregon Health Sciences University	8,284.00
University of Connecticut.....	7,500.00
University of Massachusetts.....	7,500.00
University of Massachusetts.....	10,000.00
Public Health Foundation	27,381.00
Association of Occupational and Environmental Clinics	25,950.00
Maryland Department of Environment	9,143.00
North Carolina Department of Health and Natural Resources	10,000.00
Clark Atlanta University	25,000.00
State of Nebraska	7,500.00
University of Iowa	7,192.00
University of Utah	10,000.00
National Environmental Health Conference	25,000.00
Total	271,831.00